1989 Annual Editorial Index

The "Annual Editorial Index" is designed to put a year's worth of **BE** articles at your fingertips. Here's how you use it.

The index begins with a month-by-month compilation of all feature articles, regular columns and field reports that appeared in the magazine during the past year. Where applicable, each article review includes a brief list of key words—words and phrases that were defined and used in the story.

Beginning on page 114, you will find a cross-reference listing of articles and columns, arranged alphabetically by general subject area. If you know you saw an article about a particular topic, but can't remember which issue, this listing will guide you in the right direction, and maybe lead you to a related article.

January 1989

Theme: Broadcasting From the Field

Editorial (page 6)
• No guts, no glory
(How do you spell success in broadcasting in the 1990s? Innovative and creative ways to meet challenges in every department and a concerted effort among departments bring greater rewards than copying.)

FCC Update (page 8)
• Rule changes permit short-spaced assignments for FMs with directional antennas.
• City-of-license rules allow change of city without challenges on license assignment.
• Synchronous AM not authorized, based on unresolved technical difficulties.
• One-to-a-market rule refined to allow for multiple ownership of radio, TV stations in selected markets on waiver basis.

Strictly TV (page 10)
• Inside the Visual PA, Part 4
(Picture quality relies on overall linearity and ability of the system to react to transients.)

re:Radio (page 12)
• Time may be ripe for new low-power FM
(A booster or translator increases the power level in the primary service area, while LPFM systems, like regular FM stations, extend coverage area.)

Satellite Technology (page 14)
• A look back at 1988
(A relatively quiet year saw little malicious interference of satellite broadcasts; most satellite channels went scrambled; fiber-to-the-home services advanced quietly; flat TVRO antennas were introduced; and networks and broadcasters lost more ground to alternative program and entertainment sources.)

Circuits (page 16)
• Semi-custom ASICs
(Application-specific integrated circuits, ASICs, offer lower costs to new designs by starting from devices more closely suited to the design objective.)

Troubleshooting (page 18)
• Use a color scheme for wiring
(Color coded wiring and labels facilitates circuit and signal tracing.)

Management for Engineers (page 20)
• Management profiles, personalities, Part 1
(A world of different personalities requires management skills to cater to variations in order to work successfully with all employees.)

• **Planning for Mobile Operations** (page 26)
by Richard Rudman, C.E., KFWB-AM, Los Angeles
Design and construction of a practical news vehicle combines technical needs of relays from remote sites with reasonable working conditions for the staff. A full-sized vehicle with a heavy-duty "police" package is advised. Equipment mounting calls for ingenuity for convenience and efficient operation.
Key words: vehicle accessories, security, mixer, recorder, RPU, cellular phone, mounting, power, noise.

• **Using Cellular Telephones** (page 42)
by Michael Heiss, consulting editor, Los Angeles
Cellular telephones receive broadcasters' approval because of voice, data and fax capability the technology affords. Different styles, from mounted to portable units, allow new freedom to users, as does roaming between cells while keeping in touch with the station.
Key words: cellular, transportables, dual NAM, roaming, data, fax transmission.

• **Computerized Election Reporting** (page 52)
by Mark Fenton, KSL-TV, Salt Lake City
The radio/TV public expects accuracy and speed in election news reporting. To serve the audience, KSL constructed a system with remote PCs, a LAN within the facility for rapid data transfer, methods to improve data integrity and other ways to make election night coverage more valuable.
Key words: LAN, modems, error detection, remote PCs.

• **Ethernet in the Newsroom** (page 58)
by Tyler North, automation consultant, Dynatech, Madison, WI
An ideal automation system handles equipment operation requirements as well as communications with people and information sources beyond the station walls. Networks can be used, including Ethernet LAN, a non-centralized structure that expands in any direction from any point for the most flexibility.
Key words: LAN, linear, star, tree, Ethernet, CSMA/CD, taps, token ring.

• **The Chemistry of Batteries** (page 68)
by Carl Bentz, technical editor
Different battery chemistries offer different advantages, but all involve balanced chemical reactions among the ingredients making up the battery cells. An overview of chemical processes inside lead acid and nickel-cadmium batteries notes new portable power technologies that may be available soon.
Key words: chemical reactions, NiCad, lead-acid, charging.

• **Tracking the State-of-the-Art** (page 78)
by Jerry Whitaker, editorial director

1989 Annual Editorial Index

The "Annual Editorial Index" is designed to put a year's worth of **BE** articles at your fingertips. Here's how you use it.

The index begins with a month-by-month compilation of all feature articles, regular columns and field reports that appeared in the magazine during the past year. Where applicable, each article review includes a brief list of key words—words and phrases that were defined and used in the story.

Beginning on page 114, you will find a cross-reference listing of articles and columns, arranged alphabetically by general subject area. If you know you saw an article about a particular topic, but can't remember which issue, this listing will guide you in the right direction, and maybe lead you to a related article.

January 1989

Theme: Broadcasting From the Field

Editorial (page 6)
• No guts, no glory
(How do you spell success in broadcasting in the 1990s? Innovative and creative ways to meet challenges in every department and a concerted effort among departments bring greater rewards than copying.)

FCC Update (page 8)
• Rule changes permit short-spaced assignments for FMs with directional antennas.
• City-of-license rules allow change of city without challenges on license assignment.
• Synchronous AM not authorized, based on unresolved technical difficulties.
• One-to-a-market rule refined to allow for multiple ownership of radio, TV stations in selected markets on waiver basis.

Strictly TV (page 10)
• Inside the Visual PA, Part 4
(Picture quality relies on overall linearity and ability of the system to react to transients.)

re:Radio (page 12)
• Time may be ripe for new low-power FM
(A booster or translator increases the power level in the primary service area, while LPFM systems, like regular FM stations, extend coverage area.)

Satellite Technology (page 14)
• A look back at 1988
(A relatively quiet year saw little malicious interference of satellite broadcasts; most satellite channels went scrambled; fiber-to-the-home services advanced quietly; flat TVRO antennas were introduced; and networks and broadcasters lost more ground to alternative program and entertainment sources.)

Circuits (page 16)
• Semi-custom ASICs
(Application-specific integrated circuits, ASICs, offer lower costs to new designs by starting from devices more closely suited to the design objective.)

Troubleshooting (page 18)
• Use a color scheme for wiring
(Color coded wiring and labels facilitates circuit and signal tracing.)

Management for Engineers (page 20)
• Management profiles, personalities, Part 1
(A world of different personalities requires management skills to cater to variations in order to work successfully with all employees.)

• **Planning for Mobile Operations** (page 26)
by Richard Rudman, C.E., KFWB-AM, Los Angeles
Design and construction of a practical news vehicle combines technical needs of relays from remote sites with reasonable working conditions for the staff. A full-sized vehicle with a heavy-duty "police" package is advised. Equipment mounting calls for ingenuity for convenience and efficient operation.
Key words: vehicle accessories, security, mixer, recorder, RPU, cellular phone, mounting, power, noise.

• **Using Cellular Telephones** (page 42)
by Michael Heiss, consulting editor, Los Angeles
Cellular telephones receive broadcasters' approval because of voice, data and fax capability the technology affords. Different styles, from mounted to portable units, allow new freedom to users, as does roaming between cells while keeping in touch with the station.
Key words: cellular, transportables, dual NAM, roaming, data, fax transmission.

• **Computerized Election Reporting** (page 52)
by Mark Fenton, KSL-TV, Salt Lake City
The radio/TV public expects accuracy and speed in election news reporting. To serve the audience, KSL constructed a system with remote PCs, a LAN within the facility for rapid data transfer, methods to improve data integrity and other ways to make election night coverage more valuable.
Key words: LAN, modems, error detection, remote PCs.

• **Ethernet in the Newsroom** (page 58)
by Tyler North, automation consultant, Dynatech, Madison, WI
An ideal automation system handles equipment operation requirements as well as communications with people and information sources beyond the station walls. Networks can be used, including Ethernet LAN, a non-centralized structure that expands in any direction from any point for the most flexibility.
Key words: LAN, linear, star, tree, Ethernet, CSMA/CD, taps, token ring.

• **The Chemistry of Batteries** (page 68)
by Carl Bentz, technical editor
Different battery chemistries offer different advantages, but all involve balanced chemical reactions among the ingredients making up the battery cells. An overview of chemical processes inside lead acid and nickel-cadmium batteries notes new portable power technologies that may be available soon.
Key words: chemical reactions, NiCad, lead-acid, charging.

• **Tracking the State-of-the-Art** (page 78)
by Jerry Whitaker, editorial director

The race between broadcast and consumer equipment performance continues, with the gap narrowing. The article describes audio tests measuring various FM receivers to find how well they performed. Results show that the FM station maintains an edge over the receivers, but the distance between the levels of performance is decreasing.
Key words: distortion, signal/noise ratio, frequency response.

Show Replay (page 102)
• Denver (SBE) show, a mile-high triumph
(With 3,300 attendance, 197 vendors and an expansive seminar program, the BE/SBE conference and '88 SBE national convention in Denver served a wide audience.)

Show Replay (page 106)
• Network unveils an HDTV surprise
(The 1988 SMPTE conference and exhibition, Javits Center, New York, hosted an HDTV system introduction by NBC. Products and concepts for improved NTSC transmissions and TV in general were introduced or discussed.)

SBE Update (page 110)
• Express your view on licensing issues.
"What is an engineer?" the State of Texas asked and debate resounded from all sides.
• PCB disposition is a subject of concern.
• Frequency coordinator list is available.

News Special Report (page 112)
• Updating the VOA
by James Wood, consulting engineer
(Voice of America modernized after detailed analysis of products before letting contracts for AM and shortwave equipments.)

Applied Technology (page 114)
• Doubly truncated waveguide
(An investigation of suggested benefits of hollow circular waveguide leads to introduction of doubly truncated waveguide, a transmission feedline that does not support cross-polarization and does not require tuning, absorbing loads and other hardware required by circular waveguide material.)

Field Report (page 119)
• Gentner VRC-1000 remote control.

Station-to-Station (page 123)
• Audio step generator makes testing easier
(For construction project aficionados, a suggested circuit forms an audio tone generator to step through the spectrum of interest for response tests.)

February 1989
Theme: Dealing With Digital Technology

Editorial (page 6)
• "We're just here to help"
(The FCC deregulated licensing of broadcast engineers; now state governments propose to be involved in an area not designated for state control. For determining an individual's qualification for engineering positions, the SBE certification program is superior to any state jurisdictional body.)

FCC Update (page 8)
• Protecting your station from PCB problems; review of EPA rules regarding polychlorinated biphenyls in power transformers and other electronic components.
• 24-hour ban of indecent material in place by congressional action.
• Anti-trafficking status quo withholds rules on sale, resale of broadcast properties.

Strictly TV (page 10)
• A new beginning for HDTV?
(A digital encoding plan uses specific positions on a sine wave as part of the data. The Genesys system overlays an auxiliary 3MHz signal on existing 6MHz signals without causing artifacts.)

re: Radio (page 12)
• Some thoughts about the "good old days"
(Bringing older broadcast facilities back to par is basis of reminiscence on how things were in areas of experience and technical knowledge of engineers and technicians.)

Satellite Technology (page 14)
• Spread spectrum technology
(Spread spectrum multiple access, SSMA, works where numerous, widely scattered VSAT terminals share a single transponder. Multiple users of a single channel operate without interference through code domain multiple access. Signals for each user contain address bits in a datastream to enable decoding only by ad-

Whether it's election night or the 9:30 update—Harrison teleproduction consoles.

Several years ago when you bought your present console, none of your audience had hifi, VCR tuners that let them in on the secret of your distortion or limited dynamic range. It's a more demanding market now.
Harrison's TV-4, TV-3 and Pro-790 are found all over the world in the facilities that are leading the broadcast audio revolution. Call us today to find out which one is right for your facility. We'll gladly arrange a demonstration in our factory or at your facility.

GLW ENTERPRISES, INC. • Manufacturers of Harrison Consoles • 427 Allen Drive, Nashville, Tennessee 37211 USA • Telephone (615) 331-6660 • Facsimile (615) 331-6663 • Telex 412806 (GLW NASH)

Harrison by GLW

Circle (56) on Reply Card

dressed receivers.)

Circuits (page 16)

• Technology builds on the basic telephone

(The wired telephone system is important to wireless broadcasting for remote pickups and news or other data services. In connecting equipment to telco lines, maintain the dc line impedance to avoid signal degradation. Telephone lines can carry surges from lightning or ESD sources into the station.)

Troubleshooting (page 18)

• In pursuit of the elusive intermittent

(Intermittent operation of mobile equipment often defies detection and correction. Probable causes include RF noise, thermal variations, vibration, moisture, dirt and corrosion. A detailed, well-kept maintenance log may often help to locate the intermittent.)

Management for Engineers (page 20)

• Management profiles, personalities, Part 2

(Different people and varying personalities and philosophies produce different views of a problem. Perceptions by supervisory personnel may conflict because of the natural individual differences in people.)

• **Inside Mathematics Processors** (page 26)

by Gerry Kaufhold II, SGS-Thomson Microelectronics, Phoenix

Video signal manipulation in digital special effects systems, computer-based graphics and other digital processing equipment depends heavily upon ICs called array processors. With effects programming control, images are stored in source arrays, then remapped according to program parameters to a target array before being displayed.

Key words: real time processes, array processors, matrix algebra, transposition, megaFLOPS, pipeline, parallel processing, RISC, multiport memory.

• **State of the Digital Studio** (page 42)

by Curtis Chan, Centro Corporation, Salt Lake City

Digital equipment of D-1 component and D-2 composite formats can be interfaced into a common system. Special attention is needed in routing and distribution systems, because of the parallel and serial signals and critical system timing requirements. To some extent, integrated diagnostic software will aid in troubleshooting and system maintenance.

Key words: D-1, D-2, CCIR-601, serial, parallel, A/D, D/A, signal distribution, multiplexing, conversions.

• **Disk Recording and Editing** (page 58)

by Brad Dick, radio technical editor

Recording and editing of audio with digital disk technology provides advantages, including some effects that, although possible in analog systems, would cost far more. Hard disk storage provides faster access to recorded material than linear tape storage, in addition to complete random access. Through nondestructive editing software, original material remains intact while a new edited copy is created.

Key words: Winchester hard disk, signal processing, equalization, mixing, voice coil, blocks, cylinders, effects.

• **MIDI: What's In It For Broadcasters?** (page 82)

by Richard Maddox, Muzak, Seattle

MIDI, the musical intrument digital interface, allows versatile control of musical instruments, digital synthesizers and audio processing equipment. Similar in concept to RS-232, a MIDI current loop sends logic high and low levels between interconnected equipment. A serial datastream carries system messages, channel messages and timing signals to control events affecting all or part of the equipment.

Key words: channel data, system messages, timing signals, SMPTE-MIDI conversions, setup messages.

• **Technical Education for Broadcast Engineers** (page 90)

by F. David Harris, P.E., Purdue University Calumet, Hammond, IN

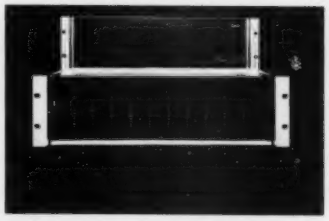
Most programs in electronics technology at institutions of higher learning, emphasize laboratory work for hands-on experience with electronic components. The requirements for mathematics and science studies differ widely, and little broadcast-specific training is provided because the greatest emphasis is on general electronics. As a result, success in broadcast engineering will depend heavily

ECONOMY
EQUIPMENT RACKS
• Available in four heights:
3'0", 4'0", 5'0", and 6'0".
• Adjustable to mount either 19" or 23"
equipment.
• Made of formed 11 GA. (.120) steel; zinc
plated with gold chromate finish.
• Accessory Options:
Wall mounting hardware
Gated rack hardware
Caster support hardware
Rack caster set
PRICED AS LOW AS $67.50
Write or call for our FREE CATALOG.
It is an engineering manual with helpful
illustrations on installation procedures.
NEWTON
INSTRUMENT COMPANY, INC.
MANUFACTURERS OF AUXILIARY FRAMING, CABLE RACKS, MISC. HARDWARE,

Circle (57) on Reply Card

Versatility

It's a Shame There is no Spec!



Were it possible to quantify versatility, the question of what to purchase would be easy. The technical performance of the System 1000 is superb, but our primary focus is to give you total flexibility. Our DA-101, for instance, can be a 2 in by 10 out mono DA capable of generating L+R or L-R, a timecode DA with a bandwidth of 200 kHz, a stereo 10 watt headphone amplifier, or a 40 watt bridged mono power amplifier. That's just the beginning. The DA-102 is a stereo 1 in by 5 out DA with a configurable sixth output that may be a 60Ω, direct, or mono mix out. Now add remote control of gain, stereo, mono, L, R, and matrix modes at master control, VTRs, downlinks, etc., to all four System 1000 DAs, and you've got versatility. Call now for full information.

Call 1-800-BNCHMRK (262-4675)
Nationwide

Benchmark
Media Systems, Inc.
N. Syracuse, NY 13212
315-452-0400

Circle (60) on Reply Card

upon individuals, self-study programs and on-the-job training programs.

SBE Update (page 96)
- Annual convention to be in Kansas City.
- Bob Flanders, SBE past president, chairman of admissions committee, VP/director of engineering WRTV-TV, to retire.
- Ennes Foundation program with Armed Forces Radio Network offers graduates of AFRTS entry-level training certification as SBE broadcast technologists.
- Uplink training program set with NAB.

Applied Technology (page 98)
- Batteries for field applications

(How well a battery serves an application is based on selection, care and maintenance.)

Station-to-Station (page 104)
- Installation works in RF environment

(Improved reception for news department receivers needed special designs for operation in a dense RF environment.)

Field Report (page 107)
- Broadcast Electronics Phase Trak 90 audio cartridge system

March 1989

Theme: Managing Automation in Broadcasting

Editorial (page 6)
- On being a technical type

(There is a stigma attached to broadcast engineers and technicians for being technical types, but if you enjoy the work, who cares?)

FCC Update (page 8)
- Lottery proposed in selection of competing applications for AM, FM and TV facilities.
- Settlement policies relaxed; construction permit awarded to a party who buys out all applicants in a new FM station contest.
- LPTV filing window open, March 6-10.
- FM downgrade handled in one-step process by filing an application proposing facilities of a lower class than that specified in Table of Allotments.

Strictly TV (page 10)
- The dollars and sense of automation

(As more facilities look to automation to improve their financial situation, engineers who adapt to the new technologies will be needed to work with the automated systems.)

re:Radio (page 12)
- 1/4-wave isolating sections still work

(For an FM transmitting antenna on an AM transmission tower, a 1/4-wave isolating section feeds the FM antenna without upsetting the AM base operating impedance.)

Satellite Technology (page 14)
- Fiber transmission seems to be the fix

(With over-the-air broadcast and cable reception schemes prone to noise, interference, reflections, distortion and fading, optical fiber presents improvements over coax.)

Circuits (page 16)
- The modem is a great communicator

(The link between the public switched telephone network and standard telephone services is the modem, a device for interfacing computers to telco lines.)

Troubleshooting (page 18)
- Maintaining your computer, Part 1

(Understanding components, peripheral configurations and their possible modes helps in computer system maintenance.)

Management for Engineers (page 20)
- And you thought you sold air time

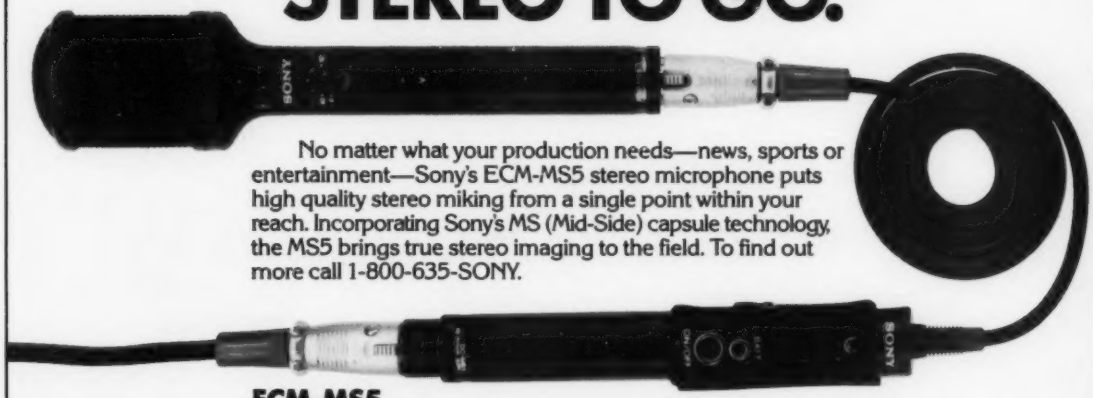
(The engineering department is an important contributor to the efforts of stations trying to reach a specific audience.)

- **The Bottom Line in Automation** (page 26) by Brad Dick, radio technical editor, and Karl Renwanz, VP/engineering/operations, WNEV-TV, Boston

An environment driven by finance and profitability forces broadcasters to automation to streamline operations and improve cost-effectiveness. Integrating automated equipment into broadcasting facilities is more successful today, because manufacturers and broadcasters better understand the complex issues that must be considered. Where automation best fits and tasks to be enhanced by machine are points to study.

Key words: intelligent subsystem, distributed intelligence, plant automation, newsroom computer, cost analysis.

STEREO TO GO.



No matter what your production needs—news, sports or entertainment—Sony's ECM-MS5 stereo microphone puts high quality stereo miking from a single point within your reach. Incorporating Sony's MS (Mid-Side) capsule technology, the MS5 brings true stereo imaging to the field. To find out more call 1-800-635-SONY.

ECM-MS5
- Three matched condenser capsule floated by a one-piece rubber shock mount
- Light weight: 7.6 oz.
- Total Mono compatibility
- Accepts 12-48V external power
- Optional accessories include: Windscreen (AD-72), Handgrip (GP-5) and DC-MS5 power supply

SONY.

Sony Communications Products Company
1600 Queen Anne Rd., Teaneck, NJ 07666.
© 1989 Sony Corporation of America. Sony is a registered trademark of Sony.

PROFESSIONAL AUDIO

• **Timing Is Everything** (page 36)
by William F. Baker, president, WNET-TV, New York

An industry that bases its income on seconds of air-time sold needs accurate time keeping, horology and intelligent clocks. At the station, a master clock contacts a reference time source through telco lines. Approximately 30 seconds of ASCII data at 300 baud updates the in-house clock from a master source and corrects for loop delays in data transmissions. A sine wave signal from the time source forms the basis of sync, video time code and real time in a cohesive video system.

Key words: time dissemination, loop delay, ASCII, SMPTE time code, RS-232, BCD code.

• **Planning for Standby ac Power** (page 46)
by Morgan Smith, building engineer, Salt Lake City

For increased profitability, standby and backup power is essential for broadcasting. In some applications, a backup power system offers a means to cut the power costs of normal operation. Size, power factor, fuel and noise sources are important considerations in selecting backup power resources.

Key words: critical and non-critical power requirements, UPS systems, noise sources, power factor, fuels, load shedding.

EXTEND YOUR LEVEL OF SUCCESS

The ATS-100 Stereo (dual channel) Extended Range Audio Meter is a self-contained audio measuring system. Dual "VU" meters provide precision visual monitoring. Peak Program Meters offer simultaneous level and peak monitoring.

The ATS-100 input sensitivity allows for a wide range of levels, from -60 to +30 dBm, and a visual indicator is provided for accurate phase measurement. The reliable, fully solid state amplifier and power supply, coupled with advanced micro-processor control, is assembled in a compact 3½" rack mount frame.

ONLY $1,980

McCurdy

McCurdy Radio Industries

108 Carnforth Road, Toronto, Ontario
Canada M4A 2L4 Tel: (416) 751-6262
Telex: 06-963533 Telefax: (416) 751-6455
1051 Clinton Street, Buffalo, New York 14206
Tel: (212) 772-0719

Circle (63) on Reply Card

• **AM Power-Reduction Techniques** (page 58)
by Tim Walker, broadcast consultant, Ruffin, NC

Several methods to reduce the AM power transmitted are available, each with its limitations. The methods include shifting of the operating point through changes in plate voltage, quadrature power dividers and inductive sampling. The system for any one station depends upon power levels, the equipment involved and the financial resources available. Caution should be used to maintain safety standards and operational economies.

Key words: plate modulation, distortion, bias currents, power dividers, apparent efficiency, dummy loads, sampling loops.

• **Getting Ready for NAB** (page 68)
by Carl Bentz, technical/special projects editor

A preview of events at the 67th annual National Association of Broadcasters convention and international equipment exhibition.

News Special Report (page 78)
• Winter CES: On the other side of the tube
by Michael Heiss, consulting editor

(The gap in performance quality between consumer and broadcast products is narrowing, bringing new interest to producing the highest possible quality in the broadcast signal. The Consumer Electronics Show offers insight to project near-future consumer buying and effects to broadcast services.)

Applied Technology (page 84)
• Digital modulation using the NCMO

(A number-controlled modulated oscillator, NCMO, provides an interface for compatible analog transmission with digital signal origination and processing.)

Field Report (page 92)
• Sola 3kVA UPS system

Station-to-Station (page 100)
• Living by the rules

(A review of FCC regulations for STL frequency assignments notes improved allocation methods.)

SBE Update (page 106)
• Debate continues on licensing, Part 1

(Do states have control over licensing of broadcast engineers? A panel discussion at Seattle chapter regional convention uncovered conflicting viewpoints.)

• An Executive Committee tentative policy statement on the subject is outlined.)

April 1989

Theme: NAB Preshow Issue

Editorial (page 6)
• Blinded by theory

(New ideas without correct lineage or proper footnotes in traditional texts often meet obstinate criticism, because the ideas do not follow theory. Sadly, such new ideas often advance the technology.)

FCC Update (page 8)
• TV rule changes follow requests; unrelated video, audio transmissions; subcarrier during monochrome programming; calibration of visual power meter each six months.

• Clarification of reporting EEO efforts.
• Repeal of fairness doctrine upheld by U.S. Court of Appeals.

Strictly TV (page 10)
• Design may prevent VDT user symptoms
(Room layout, lighting, glare, posture and physical position affect VDT operator fatigue. Radiation from CRT, often indistinguishable from background cosmic radiation, is not a concern in birth defects.)

re:Radio (page 12)
• A pirate network strives for legality
(An English organization, operating radio stations without official government approval, asks for assistance in getting a license.)

Satellite Technology (page 14)
• Space robots are at hand
(Many menial tasks involved in space station construction could be accomplished by robots, reducing the risk to human lives and loss of material, equipment and energy.)

Circuits (page 16)
• More about modems
(AFSK, return-to-zero and non-return-to-zero binary coding are discussed.)

Troubleshooting (page 18)
• Maintaining your computer, Part 2
(Hard disk systems are the most probable source of problems or failure in computers. Be aware of signs and sounds that may predict failure.)

Management for Engineers (page 20)
• On being a leader, Part 1
(Successful leadership results when an individual, promoted to a position of leadership, is able to meet various levels of human needs of employees assigned below that position.)

SBE Update (page 22)
• Debate continues on licensing issue (Part 2); the question: "Is a Broadcast Engineer really an Engineer?"; the answer: . . . ?
• Executive committee's points of policy on licensing continues.
• 25th anniversary gala celebration planned for SBE convention in Kansas City.

Show Preview (page 26)
• NAB Engineering Conference, Las Vegas, April 28-May 2

• **Designing a Post-Production Center** (page 40)
by Phil Kurz, consulting editor
The requirements of studios of the future are not clearly defined, but fundamentals in facilities design and construction can offer flexibility. Allow for expansion and change of the plans to meet needs of the future. The design must consider human and technical parameters yet remain balanced within the allowed budget. Related information describes "USA Today" production center, Infinity Broadcasting, WJLA-TV.
Key words: site survey, power up, HVAC, CAD, timing, cabling, documentation.

• **Building on the "Rock"** (page 66)
by C. Robert Paulson, Artel Communications, Hudson, MA
The decision that NBC would not leave Rockefeller Center brought plans for reconstruction. Technology is important, but many changes will be more people- and service-oriented than technological. The plan is possible through recent investments in equipment and technology, such as M-II and ARPS automation. Flexible planning will enable integration of digital technology into the facility, as well as HDTV routing, when a format decision comes to pass.

• **Acoustical Design and Monitoring Requirements** (page 76)
by Chips Davis, LEDE Designs, Las Vegas & San Rafael, CA
Audio signals from a studio microphone result from the acoustical environment in which the source and microphone are located. Noise, reflection, absorption, cancellation and frequency response must be considered in studio design. Equalization may compensate the presence of unwanted signal components, but cannot replace components lost with faulty acoustical characteristics.
Key words: EQ, cancellation, reflections, comb filter, noise, HVAC, frequency response, Eigenmodes, traps, signal polarity, near-field, far-field, localization, speaker placement.

• **Acoustical Door Design** (page 98)
by Carrol G. Wright, Jamison Door Company, Hagerstown, MA
Any opening into the studio provides an entry for noise, unless methods of sound absorption are used. An acoustical door can allow continued work in the scene shop, while a production is in progress on the opposite side of the door. Parameters to consider are the sound transmission loss (STL) or sound transmission characteristics (STC) of the wall and door material.
Key words: STL, STC, door types.

• **UHF Multichannel Antenna Systems** (page 110)
by Ernest H. Mayberry, LDL Communications, Laurel, MD, and
James T. Stenberg, Micro Communications, Manchester, NH.
Suitable antenna site real estate is becoming difficult to locate. Wideband, multiple-channel antennas for transmissions of more than one station simultaneously are economical solutions to the dilemma. VSWR, an obstacle in wideband antenna and waveguide operation, which can be controlled.
Key words: VSWR, series feed, branch feed, phase perturbation, patterns, channel separation, waveguide components, combiners.

• **NAB '89 Exhibitor Listings** (page 134) and **New at NAB** (page 186)
by Carl Bentz, special projects editor.
A directory of participating manufacturers and equipment suppliers for the NAB equipment exhibit includes descriptions of new products introduced for 1989.

• **Enhancing NTSC** (page 244)
by Rick Lehtinen, TV technical editor
Changes have enhanced NTSC TV imaging, resulting in pictures that some feel challenge the need for HDTV. A review of typical video encoding methods and suggested approaches to improvements are discussed. Of particular importance in improved NTSC is filtering, its type and location in the system.
Key words: luminance, chroma, color-difference, IQ, UV, cross-color, cross-luminance, bandwidth, noise, anti-aliasing, constant luminance, gamma, flicker, dimensional filters.

Field Report (page 260)
• Odetics TCS2000 video cart machine
Field Report (page 266)
• Ampex ACE 25 editing system
Field Report (page 272)
• Sony PCM-2500 R-DAT recorder

Applied Technology (page 280)
• Modulation monitoring for BTSC sound
(A review of the BTSC system shows how different ways of monitoring the complex multiple-channel TV aural signal may indicate the same information in a different way.)

Station-to-Station (page 290)
• Supplemental system handles remote control
(An approach to expansion of a remote machine selection and machine-control system is described.)

May 1989

Theme: Broadcast Engineering's 30th Anniversary

Editorial (page 6)
• Creating tomorrow from today
(The goal of the broadcast industry and **Broadcast Engineering** magazine is a common one: improved communication.)

FCC Update (page 8)
• AM licensees urged to cut interference through reduction of protected contours by reducing power or tower height, changing antenna reconfiguration or tower relocation; licensees will benefit from their efforts.
• Cable syndicated exclusivity rules reinstituted in simplified form; scope of network non-duplication rules extended.

Strictly TV (page 10)
• The seven layers of OSI
(The discussion reviews the layered approach to computer network communication.)

re:Radio (page 12)
• If high-tech fails, use humble basics
(Irish pirate stations granted acceptance. Today's advanced technology is well and good, until problems develop; then, fundamentals may be needed, such as, a grid dip meter instead of a TDR.)

Satellite Technology (page 14)
• It's time for spring cleaning
(Inspect the satellite antenna site for possible winter damage. New satellites are authorized and the 1990-91 NASA budget is released.)

Circuits (page 16)
• Today's modems are fast and versatile
(Modems find many applications around the broadcast facility, moving data at rates from 110b/s to 9,600b/s. Smart modems with V.32 protocol use echo signals to verify transmissions.)

Troubleshooting (page 18)
• Maintaining your computer, Part 3
(A discussion of the hard disk considers the formatting process and mechanical problems,

such as wear and its effect on servos.)

Management for Engineers (page 20)
• On being a leader, Part 2
(The ability to direct social interaction among employees and to find ways to help employees feel good about themselves and their work are top qualities of leadership.)

• Milestones in the Evolution of Technology (page 22)
by Jerry Whitaker, editorial director
An overview of technological developments over the past 30 years tracks introductions in broadcasi-related areas from equipment components to signal components, from infant FM stereo broadcasts to HDTV with multiple-channel sound and from competitive transmission methods from cable to satellite. A more cost-effective operation in broadcasting has been the impetus for changes in station and engineer licensing, tape formats, even basic circuit designs. FCC actions have definitely affected the industry, not always positively.
Key words: CATV, superstations, passive/active satellite relay, stereo multiplex, videotape and recording formats, character generators, TV transmission standards, AM stereo, composite/component video, digital video, HDTV, MSDC klystrons, Klystrodes.

• Five Decades of Magnetic Tape (page 36)
by Don Rushin, 3M professional audio-video, specialty products division
Sunday, Feb. 25, 1940, was the historic inaugural broadcast of the New British Broadcasting System, much of the broadcast made possible by audio recordings. The 40s found interest with magnetic recording in the United States as well. Since then, magnetic tape has undergone constant change, with data densities increasing significantly, allowing the introduction of video and data recording. Originally a German development by Poulson in 1898, recording technology found Bing Crosby a strong supportive figure in its rapid growth.
Key words: phony war, NBBS, Jack Mullin, paper, metal ribbon, wire, VR-1000, the Kitchen Debate.

• Perspective on the Industry (page 54)
by Jerry Whitaker, editorial director
The U.S. Patent Office said that everything was already invented in 1899. Still, the 1980s have enjoyed a constant stream of new developments, and the spring of innovation shows no signs of running dry in the 1990s. Will the future belong to radio and TV broadcast as we know it, or to transmission by fiber optics? No matter how methods of reception develop, digital technology will hold a dominating position in the future. Much of the direction taken by broadcasting will depend upon non-technical financial gurus and their attempts at increased productivity.
Key words: economics, push-button madness, electronic tuning, telco, connectivity, technical certification, smart equipment, data storage, remotes, AM vs. FM, workstations, digital recording, CCDs, advanced television, HDTV, transmitter efficiency.

• The Future of Fiber (page 74)
by Phillip Kurz, consulting editor
Glass opens our view to the universe. Similarly, fiber-optic cable vastly expands the world of communications, carrying voice, video and numerous data services directly to the home. The ISDN integrated services digital network, already in place in areas in Europe, advances today's telephone services by many levels. Several advantages of fiber—its broadband characteristics, its immunity to magnetic sources and predicted lower cost over time—indicate a bright future.
Key words: Information Age, ISDN, single-mode/multimode, pulse broadening, HDTV, CATV and fiber, telco and regulation.

• AM Radio: Regrouping for the 21st Century (page 96)
by K. Dean Stephens, professor, Amoz Gibson Centre, Arecibo, PR
AM radio pioneered the broadcast industry, becoming complacent FM and TV rapidly encroached upon its space. Now AM fights for survival. AM fidelity, often blamed for amplitude modulation disfavor, can be improved through technical housecleaning in the radio facility and replacement of outmoded equipment. Many proposals are in the works; but they must be implemented if AM is to continue as a viable radio service.
Key words: AM vs. FM, fidelity, receiver bandwidth, hum/noise, signal processing, NRSC, in-

PUT YOUR PC ON LINE
WITH THE NEW PC ACCESSIBLE
MRC 1620 REMOTE CONTROL SYSTEM

As a broadcast engineer, you want to utilize the newest PC technology that will work intelligently and make your job as easy as possible. The Moseley MRC 1620 is the first intelligent, PC-accessible, integrated package that will do just that. This cost-effective system consists of a stand alone Remote Terminal that allows an optional Control Terminal or IBM PC with TaskMaster20 software to monitor and control remote facilities from dedicated and/or dial-up control points.

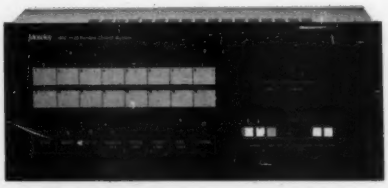
The MRC 1620

•Operates as a stand alone dial-up Remote Terminal or with standard studio Control Terminal.

•Dual communication ports at Control and Remote Terminal allow direct and dial-up access at either terminal.

•Comes standard with 32 relay isolated commands, 16 telemetry and 16 status channels with filtered terminal blocks.

•Front panel LEDs provide visual indicators of input channel and system status. Digital meter displays telemetry, channel value, calibration and limits.



Make the Intelligent Choice!
The MRC 1620 Remote Control System

The TaskMaster20 Software

•The easy to use software automatically adjusts out of parameter conditions according to user defined control strategy.

•Current alarm conditions are displayed on an "alarm" page. Up to 20 of the latest alarms and hourly log data from the last 30 hours (stored in battery backed RAM of the MRC 1620) can be reviewed at your convenience.

•Monitors up to 63 sites.

•Remote set-up attributes and calibration may be downloaded from the remote terminal and stored to disk for editing and future uploading.

For your free TaskMaster20 software demo disk, contact Moseley Marketing at 805-968-9621.

Moseley

Moseley Associates Incorporated | 111 Castilian Drive Santa Barbara, CA 93117-3093 | a Flow General Company | Phone 805 968 9621 Telex 658448 FAX: 805 685 9638

Circle (70) on Reply Card

terference, AM stereo, narrowcasting.

• **UHF-TV: Breaking New Efficiency Records** (page 104)
by Jerry Whitaker, editorial director
The costs of broadcasting wideband TV signals in the UHF band are high, simply because handling of signals at such frequencies is more difficult. Extensive experimental work with klystron devices and improved efficiency has come to fruition with the multistage depressed collector (MSDC) klystron for higher-power facilities. Improved tetrode-based systems and combinations of tetrode and klystron concepts (Klystrodes) also show enhanced energy transfer from the power input to RF.
Key words: Klystrode, MSDC klystrons, efficiency, figure of merit, pulsing, annular control electrodes.

Field Report (page 126)
• The Arrakis 10,000 series audio mixer

SBE Update (page 138)
• Manufacturers' workshops will highlight 1989 national convention; schedule contains 23 hours of seminars, 12 hours of exclusive exhibit time.
• Professional licensing discussed with National Society of Professional Engineers; most complaints against "engineers" involved contractors practicing telecommunications engineering in non-broadcast areas.
• Call made for National Officer nominations.

Show Preview (page 140)
• ITS (Montreux) to showcase HDTV festival

June 1989

Theme: NAB '89 Replay

Editorial (page 6)
• Vaporware
(A need, as perceived by manufacturers hoping to remain in business against their competition, to introduce new products at trade shows too often leads to performance claims that do not exist when the products debut.)

FCC Update (page 8)
• License renewal procedures reformed to avoid sham competing applications and petitions to deny.
• New FM Class C3 to be midway between Class A and Class C2; applicable in zone II.
• FCC Form 301 revised to request financial, ownership and integration information not currently required.

Strictly TV (page 10)
• Tape defects defined by "RF signature"
(Dropouts caused by tape defects are characterized by observing playback RF envelopes.)

re:Radio (page 12)
• Beyond the coverage map, Part 1
(Comparisons between original coverage map and current signal levels may reflect changes in ground radials and other factors.)

Satellite Technology (page 14)
• The business world turns to VSAT
(Very small aperture terminals gain in popularity for many communications needs with multiple channels per transponder using SCPC operation. New Ku-band satellites to include an L-band system for air traffic control.)

Circuits (page 16)
• Have a taste of telephone soup
(Subscriber line interface circuits form the input connection to the telco central office, providing a variety of functions.)

Troubleshooting (page 18)
• CD troubleshooting, Part 1
(Before you spend hours trying to repair a CD player, check for a faulty CD.)

Management for Engineers (page 20)
• On being a leader, Part 3
(Promotions sometimes cause the tyrant syndrome; a better approach is to form a management team composed of the people in the department being supervised.)

• **Perspective on NAB '89** (page 23)
by Jerry Whitaker, Editorial director
What is the future of HDTV? Can broadcasters and Bell coexist? How will alternative entertainment services affect broadcasting? These questions posed by NAB attendees about the destiny of the industry, found few straightforward answers. A consensus of NAB, FCC and others suggests that major changes are imminent, but the nature of those changes is unclear.

• **The HDTV Scorecard** (page 32)
by Phil Kurz, consulting editor
The future of HDTV as a transmission medium is poorly defined. Two special demonstration areas showed proposed HDTV systems to numerous observers, but the quest for "one" system remained unanswered.
Key words: terrestrial transmission, encrypted B-MAC, NTSC compatible, SuperNTSC, line doubling, Genesys, MUSE, HDB-MAC, SC-HDTV, SMPTE 240M.

• **The Automation Equation** (page 42)
by Rick Lehtinen, TV technical editor
Technology has downsized many broadcast products and introduced communications links, allowing computers to perform many functions in the modern station facility. Industry buzz words often heard at NAB '89 were robotics and LANs.

• **NAB Engineering Conference Report** (page 46)
by Brad Dick, radio technical editor
The engineering conference schedule of concurrent sessions and evening hands-on workshops covered the entire transmission chain with many sessions emphasizing digital techniques for traditional analog functions. Many sessions focused on FM technology, performance improvements and reception problems. AM systems engineering received significant attention, including discussion of new antenna designs. TV topics viewed areas of digital technology in creation and manipulation of images and viewed transmission systems in regard to improved efficiency, including the MSDC klystron.

• **The Pick Hits of NAB '89** (page 72)
by Brad Dick and Rick Lehtinen, technical editors
TV pick hits included: *AF Associates* Roboped robotic camera head positioning system; *Abekas* A-34 Solo digital production system; *Ampex* ADO-100 effects system; *Auditronics* 1900 mix-minus signal routing system; *BTS* LDK-91 CCD camera; *Grass Valley Group* DPM-100 effects system; *Harris Broadcast* Platinum series solid-state TV transmitters; *Lectrosonics* H185 plug-on wireless mic transmitter; *Mobile Data International* data terminals; *Tektronix* 1780R video measurement set; *TSM* SP-200 Autocam robotic camera pedestal with X-Y option; *Videotek* VDP-8400 framestore and synchronizer; *Vinten Broadcast* Automotion robotic camera pedestal.
Radio pick hits included: *Alldesigns* DAMS hard-disk replacement for audio cart machine; *Broadcast Electronics* FX-50 FM exciter; *Delta Electronics* SNG-1 stereo noise generator; *Dorrough* #1200 stereo signal test set; *Harris Broadcast* DX-50 solid-state, digitally modulated AM transmitter; *Moseley* 8-channel multiplexer; *QEI* Cat/Link T1 compatible 2-way wired STL; *TFT* 886/887 EBS system and 8900 synchronous FM exciter; *Tri-Tech* RBS 801 remote broadcast studio.

• **New at NAB** (page 88)
by Carl Bentz, special projects editor
A compilation of new products introduced at NAB includes introductions since NAB '88.

• **HDTV: Politics on a Grand Scale** (page 186)
by Jerry Whitaker, Editorial director
The discussions have moved from technical merits and marketing to the realm of politics, resulting in questions that are far more difficult to resolve than the technical differences in TV systems around the world. HDTV has become a matter of national pride and national security. No agreement on standard scan and frame rates or spectrum bandwidth requirements has been achieved. One major question begs an answer: "How fast will consumers flock to HDTV once it is available in the marketplace?"

• **The SBE Observes a Milestone** (page 192)
by Brad Dick, radio technical editor
The Society of Broadcast Engineers celebrates its 25th anniversary. Organization of the society followed a suggestion of then **Broadcast Engineering** editor John Battison and has grown to a membership greater than 5,500 with more than 80 chapters around the nation.

SBE Update (page 193)
• National Conference on Engineering Specialty Certification meets with associations covering a broad range of engineering disciplines.
• SBE council requests an opinion from Texas State Board of Registration regarding the title of "engineer" and its use in broadcasting.
• Paul Montoya to fill vacancy on national board of directors.
• ITVA to hold technical conference concurrent with SBE national convention in Kansas City.
• Frequency coordinators receive suggestion that commercial answering services would make them more accessible by individuals needing frequency information.

July 1989

Theme: Improving Your Audio Product

Editorial (page 6)
• Managing the future together

(The **BE** conference, held in conjunction with the SBE convention, offers a chance to learn to deal with new equipment.)

FCC Update (page 8)
- A/B cable switch requirement imposed, allowing cable subscribers an easy method to return to off-air viewing during cable malfunctions.
- EEO standards enforced, resulting in short-term renewal and fine for Maryland AM/FM broadcaster.
- Federal Communications Bar Association proposes reforms to FCC comparative hearings process, while FCC ponders use of lottery techniques for competing application situations.

Strictly TV (page 10)
- VBI heats up

(Insertion of data into the relatively vacant vertical blanking interval provides additional video services.)

re:Radio (page 12)
- Beyond the coverage map, Part 2

(Complaints about station coverage may mean a changed radiated pattern, which in turn means a change in antenna current or impedance.)

Satellite Technology (page 14)
- Sunspots affect communications

(Solar activity, sunspots or solar flares, caused by magnetic field variations on the sun, affect the ionization of ionospheric layers and how those layers reflect radio waves.)

Circuits (page 16)
- ISDN to bring better service

(The integrated services digital network will offer improved telephone services with new capabilities, such as HDTV and data.)

Troubleshooting (page 18)
- CD troubleshooting, Part 2

(Before trying to find the problem in the CD player, consider possible problems in the manufacture of the CD medium.)

Management for Engineers (page 20)
- On being a leader, Part 4

(A management team approach has many advantages, among them chances for the individuals to become "more important" in the operation.)

- **Control-room Monitoring Systems** (page 26)

by Brad Dick, radio technical editor

Audio equipment in today's control room exhibits excellent performance, but the ultimate test is: "Do the room and monitoring system sound good?" Various causes produce less than perfect performance: flaws in the acoustics of the room environment, distortion in the system, background noise from various sources. Proper reverberation time, room equalization, a uniform distribution of sound, speaker selection and interaction of surfaces are all part of good sound.

Key words: IM, TIM, THD, HVAC, noise, reflections, reverb, half-space loading, frequency dependence, room EQ.

- **Using Close-field Monitors** (page 42)

by Jeff Blenkinsopp, audio consultant, New York

Close-field monitoring is considered by many as the preferred standard listening reference. A small pair of speakers, often sitting on the mixing console, are positioned to place the audio operator's listening point within the direct sound field. The technique generally removes effects of the room environment on the sound. Objections to the technique include the loss of bass response typical of some small speakers. *Key words:* acoustical environment, wiring, power ratings, bass/sub-bass systems, frequency response, multiple cabinets, remote production.

- **Planning for an Audio Routing Switcher** (page 56)

by David L. Bytheway, switching hardware manager, BTS, Salt Lake City

Flexible distribution of sound in the broadcast and production facility depends upon quality and capability of distribution amplifiers and switching equipment. Although patchbays could serve routing purposes, switching provides more flexibility with instantaneous response to changing routing requirements. The complexity of stereo and multiple audio channels demands multilevel control capability. *Key words:* single output controllers, take but-

Circle (74) on Reply Card

TIMECODE EDITING...
LIVING DANGEROUSLY?

Not if you have the new ADx-02 Timecode Analyzer. This is a sophisticated test instrument, as well as a fully functional reader–generator with video Key and L.E.D. displays. It can save you time and money. Finding timecode errors on tape before an edit is attempted, or matching color frames and ScH phase, or tracking on a Betacam is easy. For the engineer, it can be the quickest way to set tape speed, realign video play-back heads or check an audio synchronizer for *wow*. Each timecode bit is displayed graphically.

The ADx-02 is being used around the world in a variety of environments and applications. But the diagnostics function is not the end of the story, the ADx-02 is a very versatile timecode reader–generator–inserter, with multiple screen displays, selectable fonts, three jam-sync modes, stable code generation, full speed range read and much more. So why buy just a timecode reader–generator?

The ADx-02.
The only timecode unit that can safely save you money.
Call us for our new 1990 audio products brochure

ADx Systems Inc.
274 Madison Avenue, New York, NY 10016
The World Leader in Timecode.

For more information contact your local dealer or call us at 1-800-444-4-A-D-X.

Circle (75) on Reply Card

ton, SAP, time code, stereo, matrix switches, reentry, phase inversion, X-Y controller, distortion, linearity, noise, crosstalk, RF sensitivity, transformer coupling, digital audio, balanced/unbalanced, floating, level matching.

• **Managing Satellite Operations** (page 88)
by Richard Maddox, chief engineer, Muzak, Seattle

Signal relays by satellite has become an important part of radio/TV broadcasting. The growing dependency of business and broadcast on satellite relays sometimes makes it difficult to get a channel when it is required. Beyond the normal uplink and downlink locations, satellite transmission and reception may not be arranged as easily as expected. Along with scheduling, budgeting for satellite time charges is critical in managing the satellite operation.
Key words: C-/Ku-band, IFB circuits, time charges, limitations, time brokers, footprints.

• **Setting Standards for the Future** (page 98)
by Don McCroskey, BE consulting editor

Standards in the broadcast and communications industries refer to basic specifications that allow operational interchangeability among different pieces of equipment. Such specifications develop at various levels—from within a company for economic reasons to the efforts of professional engineering societies, who often play mediator between interested parties. Over the years a number of organizations have taken part in recommending and adopting standards.
Key words: interchangeability, SMPTE, ASA, IEC, ISO, ITU, CCIR, ANSI, EIA, IEEE, RETMA, AES, guidelines, recommended practices, NTSC, NAB, ATSC, fair trade.

SBE Update (page 108)
• Board adopts licensing policy that directs the national SBE to pursue modifications of statutes, should licensing crises arise; no rationale for state licensing of broadcast engineers has been found.
• Ennes Scholarship Fund awards to part time broadcast engineer studying electrical engineering and master control/tape operator pursuing a bachelor's degree. Foundation award to another student who is master control operator and is responsible for transmitter and satellite operations.
• "SBE Signal" editor hired.
• Ennes workshops, to be held the day before the national convention, will be conducted by factory instructors using a hands-on approach.

August 1989

Theme: Video Technology Update

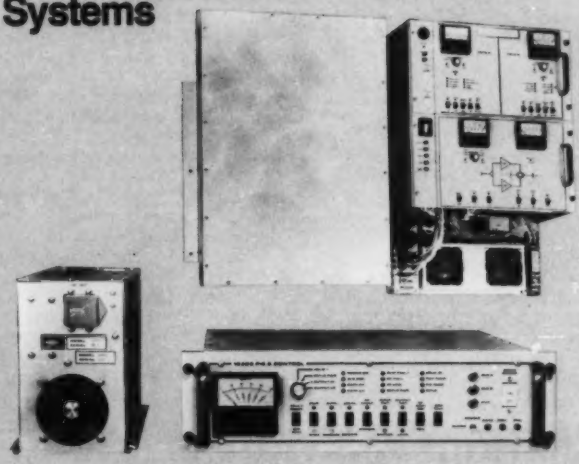
Editorial (page 6)
• Postcard from Montreux
(Montreux is a nice place to visit, but its viability as the venue for International TV Symposium is questionable.)

FCC Update (page 8)
• Congress urged to repeal copyright law.
• Tax certificate decision reversed (December 1988 decision involving a minority-owned St. Louis cable company).
• Repeal of 2-year affiliations limit.

Strictly TV (page 10)

GLOBAL SUPPORT FOR GLOBAL COMMUNICATIONS

Ku-Band Special Application TWT Amplifier Systems



Tested, tried and proven by communications experts worldwide, MCL's Ku-Band Special Application TWT Amplifier Systems meet—and exceed—industry requirements for reliable performance under all conditions. Advanced technical design and superior mechanical layout allow MCL equipment to operate effectively even in the most extreme cases: interference (EMI-radiation/RFI-susceptibility), electrical (power source), mechanical stress, environmental (temperature/humidity), general maintenance and transportable applications.

MCL offers a wide range of Ku-Band Special Application TWT Amplifier Systems designed specifically for the transportable satellite communications (video, voice and data) market. For those who require hub-mounting or portable equipment, MCL has deliverable switch-mode power supplies and a new range of special configuration 1:1 redundant and VPC TWT Amplifiers utilizing these power supplies. Output powers range up to 500 Watts for a phase combined unit.

MCL is the leading manufacturer of high-quality, competitively priced amplifiers, all of which are noted and proven for *unsurpassed performance.*

For technical specifications and detailed information about MCL's Ku-Band Special Application TWT Amplifier Systems, call or write MCL, and request your FREE copy of MCL's *New* Brochure #6010.

MCL, INC.
501 S. Woodcreek Road
Bolingbrook, IL 60439
708-759-9500 TWX 910-683-1899

Manufacturers of TWT and Klystron Amplifiers for Satellite Communications
24-Hour Sales and Technical Support for Immediate Service Worldwide

Circle (72) on Reply Card

• Designer test signals aid troubleshooting
(Numerous changes in TV technology have reduced the relevance of some test signals, particularly in component facilities.)

re:Radio (page 12)
• Taking the measure of your station, Part 1
(Operating frequency measurement remains a requirement; bandwidth compliance for AM is important,too, but an NRSC-1 filter is an acceptable alternative to the FCC.)

Satellite Technology (page 14)
• The making of a space station
(NASA plans for Space Station Freedom, a joint project between the U.S., Japan, Canada and the European Space Agency, to be assembled in space in mid-1990s, following a sequenced launch of individual sections.)

Circuits (page 16)
• Thermistors used in temperature control
(Background on positive and negative temperature coefficient thermistors includes a sample thermistor circuit controlling a crystal oven.)

Troubleshooting (page 18)
• CCD troubleshooting, Part 3
(Possible variations from the Red Book standards in the preparation of CD media are the focus, along with a look at physical damage or imperfections in the manufacturing process.)

Management for Engineers (page 20)
• On being a leader, Part 5
(As manager of an engineering department you need not solve every problem, but you are responsible for seeing that the problems do get solved. A team approach and structured plan to problem solving are valuable concepts.)

• Easing into Newsroom Automation (page 26)
by Rick Lehtinen, TV technical editor
Automation represents a substantial commitment of station resources and demands decision-making that can prescribe choices in the future. A phased approach allows concentration on automation for a maximum return on the investment and gains perspective toward evaluation of subsequent automation steps. Until standardization of data and control protocols exists, caution toward long-term goals is advised.
Key words: robotics, information and signal flow, LAN topologies, interfacing.

• Inside Standards Conversion (page 38)
by Rick Lehtinen, TV technical editor
The purpose of standards conversion is decoding of composite video to components with interpolation and storage of the components in a memory. The memory buffers the data which is extracted in accordance with different line and frame rates and subsequent re-encoding of the components into the new timing structure. At the heart of conversion are filtering processes that perform weighted averaging on a series of adjacent samples. Selection of coefficients determines the value of a sample if one were taken at a certain location, introducing an interpolation process.
Key words: transmission standards, color difference component formats, A/D-D/A conversions, encoders, decoders, temporal and spatial filtering, motion artifacts, judder.

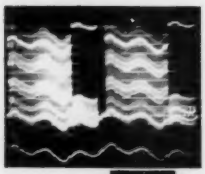
• Advances in Analog Instrumentation (page 56)
by Margaret Craig, Tektronix, Beaverton, OR
The advances of digital equipment in metrology and in the video signal chain might suggest that analog instrumentation is passé but analog test equipment has improved, with waveform monitors and vectorscopes processing signals completely in the analog domain and displaying the result in real time as the waveform actually occurs. Analog monitor frequency response exceeds that of practical digital equipment. Microprocessor-control circuitry adds more flexible capabilities with on-screen alphanumeric information on equipment status.
Key words: real time processing and display, frequency response, microprocessor control, alphanumeric readout, cursors, analog component measurement.

• The Ins and Outs of Microphones (page 70)
by Brad Dick, radio technical editor
A tutorial on microphones includes cutaway drawings to explain the differences among dynamic, condenser and ribbon mics. The discussion focuses on sensitivity, pickup patterns and

STOP GROUND-LOOP HUM!

VIDEO HUM STOP COIL...HSC 2

Will ELIMINATE HUM and other INTERFERENCE in Video Lines caused by differences in Ground Potential.



- Rack Mountable.
- FLAT-DC to 6.5 MHz.
- No low-Freq or Hi-Freq. Roll-off.
- No Differential Phase Distortion.
- No Differential Gain Distortion.
- No Envelope Delay.
- Passive Device - Failure Free-Low Price.
- Small Compact Package 4" x 4" x 2-¼".

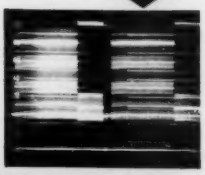
NEW!

F. O. B. N.Y.

ELIMINATES HUM AND INTERFERENCE:

IN STUDIO
- Between Buildings
- On long runs in Buildings
- Between Studio and Transmitter
- On Incoming Circuits
- On Outgoing Circuits

IN FIELD
- Betw. Remote Truck and Telco
- Betw. Remote Truck and Microwave
- For Intertruck Hookup
- For VTR Units
- For Monitoring Lines

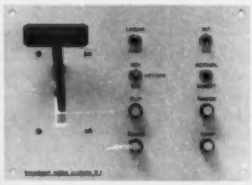


Available on 10 day free trial

AUDIO-VIDEO ENGINEERING COMPANY
65 Nancy Blvd., Merrick, N.Y. 11566
Tel. (516) 546-4239

Circle (77) on Reply Card

MASTERKEY™



Much more than a Linear Keyer!

- *Switchable between **LINEAR** and **FAST** key modes*
- *Smooth **SEAMLESS INLAY** of DVE's and Paint Boxes*
- *Preserves the clean edge of anti-aliased equipment*
- *Separates down to **5 IRE** anywhere in grey scale*
- *Variable **SOFT** key • **INVERT** key*
- ***CUT** to **KEY, MIX** to **KEY** or **A/B MIX***
- *All user controls on remote panel*
- *Stand alone operation*
- *Optional **AUTO MIX** via G.P.I.*

THE ONLY WAY TO KEY

broadcast video systems ltd.

40 West Wilmot Street, Richmond Hill, Ontario L4B 1H8
Telephone: (416) 764-1584 Telex: 06-964652 Fax: (416) 764-7438

Circle (78) on Reply Card

selection of microphones for particular applications. The mid-side stereo system is examined with conversion matrices to produce left-right output signals. Boundary microphones and remotely adjustable units with multiple capsules in a tetrahedral arrangements allow control over the apparent pattern, angles and even "shape" of the room.
Key words: moving coil, dynamic, condenser, electret, ribbon, performance characteristics, directional patterns, frequency response, coloration, proximity effects, multiple mic setups, stereo systems, Blumleinn configuration.

• **Role of Film in Television** (page 98)
by Jerry Whitaker, editorial director
A perspective over 30 years of broadcasting examines the use of film as a production medium; the developments by George Eastman in film technology; the Edison camera; and the role of film in TV operations today. Although changes have occurred in how film is used, the light-sensitive medium remains viable.
Key words: George Eastman, Thomas Edison, Kodak, glass plate, gelatin emulsions, Kinetoscope, Photophone sound, news departments.

Show Replay (page 106)
• International TV Symposium at Montreux
(A PAL version of NAB, the ITS exhibition focused on Eureka EU95, HDTV and fibercasting.)

SBE Update (page 110)
• Register early for Ennes workshops, a hands-on approach introduced at this year's convention.
• 25th anniversary celebration of SBE and spouse program planned.
• New officers to be installed.

Applied Technology (page 111)
• Film-to-tape transfer systems
(Flying spot telecine systems maintain their position as transfers from film to video continue to be an important part of television.)

Station-to-Station (page 115)
• Vertical interval AGC meter
(Construction project provides alternate method to simplify remote unit microwave link setup.)

News Special Report (page 118)
• An ATTC progress report
by the **BE** staff
(A review of subcommittees making observations on proposed advanced TV systems. A number of approaches to improved TV transmissions and associated systems are scheduled for consideration.)

September 1989

Theme: Audio-Video Control Systems

Editorial (page 6)
• Rethinking EBS
(The Emergency Broadcast System is designed for presidential contact with the nation in times of emergency, not for warning of pending disaster, although states can and do use the system in various ways, including broadcasts of severe weather conditions. Additional funds are being funneled to harden 30 stations positioned to allow continued operation in time of disaster. Perhaps it's time to reconsider our attitudes about the EBS operation.

FCC Update (page 8)
• Class A FM power increased to 6kW if certain separation requirements are met.
• Multiple ownership rule changes affirm February '89 action, allowing multiple facility ownership based on waivers.
• Antenna light requirements enforced by commission, produces fines for stations not complying with lighting rules.
• Sonrise Management Services under investigation for possible conduct abusing FCC processes and violations of criminal code.

Strictly TV (page 10)
• Exploring battlefield fiber
(Fiber-optic applications for ENG uses designs developed for military purposes.)

re:Radio (page 12)
• Taking the measure of your station, Part 2
(Bandwidth compliance or splatter control—attenuation of the station's output lying outside the assigned spectrum—to reduce interference with other stations receives critical FCC attention. A poor man's spectrum analyzer is described, and incidental phase modulation is discussed.)

Winsted®
THE MATCHMAKERS
for the customized approach to videoproduction centers.

Portable
PRODUCTION
CONSOLE

For in-house or on location—a complete production facility in one compact portable unit. Ample 47¼" of rack space puts all your equipment within easy reach. Large selection of modular components offer many variations.

For full-line catalog of editing, production and dubbing consoles, tape and film trucks, film and videotape storage systems, call or write:

MODEL
P9201

THE WINSTED CORPORATION
10901 Hampshire Ave. So. • Minneapolis, MN 55438

Toll Free: 800-447-2257
TELEX: 510-601-0887
FAX: 612-944-1546

Winsted

Circle (80) on Reply Card

FOR THE RECORD

OTARI MX-55 "Workhorse"

A new concept in ¼" Compact Recorders

Also Tascam, Revox, Marantz

Buy It
FOR A
SONG

Call Now:
1-800-356-5844

FULL COMPASS SYSTEMS

608-271-1100
5618 Odana Road
Madison, WI 53719

Circle (79) on Reply Card

Satellite Technology (page 14)
• Team goes to work in robotics center
(NASA's Goddard Space Flight Center develops robotics technology to support future space flights, but before that technology is needed, satellite relay is being used for international medical teleconferencing.)

Circuits (page 16)
• Using thermistors for time delay
(The thermal characteristics of thermistors serve in timing circuits and time delays.)

Troubleshooting (page 18)
• CD troubleshooting, Part 4
(In this installment regarding CD system difficulties, user-caused damage to the CD surfaces and the physics of scratches are examined.)

Management for Engineers (page 20)
• On being a leader, Part 6
(Management depends upon effective decision making, which requires active listening.)

• **Switching Fiber-Optic Signals** (page 26)
by Rick Lehtinen, TV technical editor
The value of fiber optics in avoiding external signal pickup has given the technology a boost of acceptance. Inside the station, where such problems are usually of less concern, applications for fiber may not be developed until higher definition signals must be routed. Then, signals on the fiber will need to be switched. Various methods include tree and star configurations with bidirectional optical couplers and mechanical moving-fiber switches. Switching speed is a concern.
Key words: FO splicing, connectors, star and tree couplings, bidirectional coupling, moving fiber switching, Raman scatter.

• **Writing Applications Programs for a PC** (page 42)
by Ron Balonis, C.E., WILK-AM, Wilkes-Barre, PA
PCs have a position as the electronic assistant in many broadcast facilities. Most useful are pre-written and user-written application programs that enable the computer to perform tasks or solve problems. Writing your own programs requires more than just coding; you must determine how the problem is to be solved, then convert that to code that can be understood by the computer through the use of an interpreter or compiler.
Key words: algorithms, programming style, BASIC, debugging.

• **The CCD Scoreboard** (page 57)
by Rick Lehtinen, TV technical editor
CCDs have advanced the art of ENG significantly, reducing the size of camera equipment and the budget for pickup devices. There are still problems, such as the matrix structure of the CCD itself, that may produce undesirable characteristics, but advances in technology are addressing those issues. The capabilities of the cameras, when combined with smaller tape formats have increased the possible sources of video material for broadcast.
Key words: CCDs, aliasing, spectral response, sensitivity, cost, S-VHS/ED-Beta formats.

• **Lenses: Is What You See What You Get?** (page 66)
by Carl Bentz, technical editor
Some background material on lens systems and the physics of optics also examines the microprocessor in lens designs. With a microcomputer to keep lens glass groups optimally positioned for best performance, a new generation of optical systems, designed for effective use with CCD cameras stays a step ahead of camera pickup technologies. A few words about lens care help to extend the performance of lens systems.
Key words: circle of confusion, dispersion, cam followers and element position methods, servos.

• **Designing an FM Booster System** (page 72)
by Steve Broomell, Omega International, Irvine, CA
Lower-power FM transmitters, to increase reception reliability within the assigned service area, are permitted, with frequency assignments being on the same channel of the primary station. Operation is governed by FCC rule parts 73 or 74, depending upon the power output, with emphasis on the booster providing the appropriate service without signal degradation or generation of interference. An intercity relay (ICR) may also be in order, requiring additional licensing approvals.
Key words: supplemental transmitters, ICR links, modulation noise, contour maps, service area contours, synchronous repeaters, directional antennas.

Show Preview (page 90)
• Don't miss the anniversary party
(SBE national convention plans, coupled with 25th anniversary celebration and newly introduced Ennes workshops, offer numerous drawing cards to attend event.)

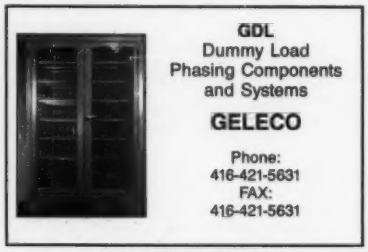
Show preview (page 106)
• SMPTE to be the season finale
(A preview of events for the 131st SMPTE technical conference and equipment exposition, Oct. 21-25 in Los Angeles.)

Field Report (page 108)
• Audio-Technica AT4462 portable mixer

SBE Update (page 114)
• Choose your candidate carefully
• Qualifications for board of directors candi-

Free Catalog & Audio/Video Applications
Routing Switchers(SI-A/V)
(24,16,12,8,4,2 stations)
Mic, EQ, Line, Tape, Phono, Osc, Trans., Video, ACH, Pwr. Supp.
Video & Audio Dist. Amps.
RGB-Sync Dist. Amps.
Press Boxes
1-in/16-out Video/Audio
2-in/24-out Audio
OPAMP LABS INC (213) 934-3566
1033 N Sycamore Av LOS ANGELES CA, 90038
Circle (84) on Reply Card

Circle (82) on Reply Card



Circle (99) on Reply Card

For AM, FM, SCA and TV modulation monitors.
WHEN ACCURACY COUNTS...COUNT ON...
Call (215) 687-5550 or write for more information on Belar AM, FM, Stereo, SCA and TV monitors.
BELAR
ELECTRONICS LABORATORY, INC.
LANCASTER AVE. AT DORSET, DEVON, PA 19333
Circle (81) on Reply Card

Jensen Twin Servo®
Mic Preamp
The world's clearest preamp – you've heard of it. Now hear it at Audio Rents (LA), The Rental Company (NY) or at your competitor's studio.
jensen transformers
INCORPORATED
10735 Burbank Blvd. • North Hollywood, CA 91601
FAX (818) 763-4574 • Phone (213) 876-0059
(Mon-Thurs, 9am-5pm Pacific time)
Circle (83) on Reply Card

dates for SBE are outlined.

• **Radio: the Roots of Broadcasting** (page 116)
by Jerry Whitaker, editorial director
Another segment in the "30 years of service" series, this installment celebrates the role of AM radio in the evolving industry. A few of the early pioneering AM stations are cited, along with some visionaries and the introduction of networks that helped to make the industry grow.

October 1989

Theme: Managing Broadcast Operations

Editorial (page 6)
• Taking audio beyond "basic black"
(TV has added diversity to audio that requires new thinking on the part of consumers—consider mono, stereo, SAP and SAP + mono.)

FCC Update (page 8)
• Policy agenda set by new chairman for FM Class A minimum distance separations.

Strictly TV (page 10)
• Organize maintenance with software
(Software packages help track employee hours, keep inventory, generate work orders and parts orders.)

re:Radio (page 12)
• Pre-winter maintenance checklist, Part 1
(Although a thorough inspection of the station facilities takes some time, it will be short compared with repair times in freezing temperatures in the middle of winter.)

Satellite Technology (page 14)
• Winter's coming; prepare now!
(The earth station is prone to damage by winter elements. The antenna surface is as critical as positioning of the antenna, relative to a satellite, in receiving the best signals.)

Circuits (page 16)
• Thermistors measure microwave power
(Glass beam thermistors in a direct-coupled bolometer circuit measure microwave power.)

Troubleshooting (page 18)
• CD troubleshooting, Part 5
(Scratches on a CD surface produce data dropouts similar to other surface incidents that upset interleaving error-correction techniques used in CD reproduction.)

Management for Engineers (page 20)
• On being a leader, Part 7
(Would the station be better off without a certain employee? Be assertive with the individual, without taking a heavy-handed approach, but make it clear that his behavior is not appropriate.)

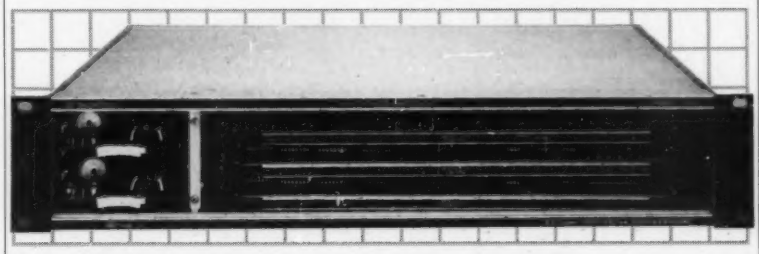
• **The 1989 Salary Survey: Dividing the Pie** (page 26)
by Brad Dick, technical editor
Most salaries have increased, even if just a little, but TV engineers would like to have seen the small increase. In general, across all markets, radio salaries have continued an upward trend. Unfortunately, TV engineering salaries also have maintained a continuing trend of little or no upward movement. The survey covers all markets and includes radio and television management, engineering and operation levels of employment.

• **Selling Management on AM Stereo** (page 48)
by John Bisset, Delta Electronics, Alexandria, VA
Upgrading a station to AM stereo may find deaf ears from management on technical matters. From a sales point of view, improved sound quality, greater appeal to the listening audience and increased revenue is information management will want to hear. Conversion may be less costly than expected.

• **AM Stereo: Its Time Has Come** (page 58)
by Ronald F Balonis, C.E., WILK-AM, Wilkes-Barre, PA
Compatible AM stereo is a reality that does not make 400 million mono AM receivers obsolete. Originally thought technically infeasible, AM stereo is possible and awaits a "marketplace" decision for a standard.

• **Audio Fidelity: the Grand Illusion** (page 68)
by Dennis R. Ciapura, VP, technical operations, Noble Broadcast Group; president of Technimax Telecommunications, San Diego
The brain operates with perceptions based

Make the Right Switch...



With The Compact (2 RU) Audio Only Routing Switcher from di-tech

MODEL 5616 STANDARD FEATURES

- 16 x 16 Stereo
- 16 x 32 Mono
- Plug-in P.C. Cards
- Serial Coax for External Control Panels
- Output Level +24 dBu @ 150 Ohm
- RS232 / RS422 Computer Control
- All I.C.'s are Socketed for easy maintenance

ALL FOR A COMPACT PRICE $5250

di-tech

48 Jefryn Boulevard, Deer Park, N.Y. 11729
Tel: (516) 667-6300 • Fax: (516) 595-1012

Circle (85) on Reply Card

on a continuous analysis of the acoustical environment. Binaural recording, intended for listening with earphones, produces serious alterations in the acoustical path from headphones to the eardrum, resulting in reduced resonance and reality. Low-frequency response depends upon bone-conduction transmission, detracting from reality effects.
Key words: fidelity, mic selection/position, effects, binaural recordings, acoustical transmission paths, transaural techniques, anti-crosstalk, close-field, control room EQ, LEDE acoustical treatment.

• **SCA Technology Update** (page 77)
by Phillip Kurz, consulting editor
An SCA carrier on a standard FM signal provides more than elevator music. Data services via SCA bring in additional revenues, as long as interference to normal service is not introduced by the unrelated auxiliary information. Several modulation techniques are available that offer individual strengths and weaknesses.
Key words: SCA channels, baud ranges, 67kHz, 92kHz, FSK on FM on FM/triple modulation, direct FSK on FM, AM on FM, wideband direct linear suppressed carrier, birdies.

• **The Mechanisms of Tape Wear** (page 84)
by Richard Maddox, chief engineer, Muzak, Seattle
The normal life of tape is a hazardous affair, enduring dirt, solvents and physical abuse. Short- and long-term wear factors reduce the useful life of tape. When handled with care and kept clean, tape has a longer useful life.
Key words: PET base, backcoat, dropout, dirt, cleaning techniques, head wear, storage conditions, machine environments, temperature effects, print-through, tape packing, lubricants, water, x-rays, loudspeakers, metal particle tape.

• **The Revolution of Television** (page 96)
by Jerry Whitaker, editorial director
TV has become the most effective communications medium in the history of man. From humble beginnings to its sophisticated status today, TV presents a story of surprises, successes and failures. The article details work by Farnsworth and Zworykin, both important to TV development, and extends to NTSC color, the CCD camera and UHF transmissions.
Key words: Nipkow disc, Zworykin, Farnsworth, Sarnoff, iconoscope, image dissector, flying spot, interlace, image orthicon, vidicon, CCD, additive color, Trinescope, shadow mask, NTSC, CBS whirling disc, PAL, SECAM, UHF.

Applied Technology (page 128)
• Surround sound for television
(An examination of the Dolby Motion Picture Matrix discusses producing the greatest possible reality in TV sound.)

Station-to-Station (page 138)
• Spare parts shortage leads to innovation.
(Depletion of spares stock and obsolete equipment in aging microwave system call for modification of a dual conversion unit to a single conversion system.)

Field Report (page 146)
• Hewlett Packard Goldline model 30 real-time analyzer

SBE Update (page 148)
• Sharing views on society issues helps officers provide positive, constructive solutions.
• Executive director and the possible move of the national office to Washington are discussed.
• Cooperative agreements: should SBE involve other organizations, such as NAB, in its convention? The responses are mixed.
• Society priorities: rewriting of Ennes books, certification, curriculum approval of schools and training seminars; communications and publicity; discussions of policy issues, rather than quick solutions by the executive board.
News Special Report (page 149)
• Broadcasting in a borderless Europe
by John Blau, European correspondent
A united European community is developing well with a rapidly expanding commercial television industry in satellite and terrestrial channels. Satellite technology is only part of the European TV revolution, with cable networks and ISDN showing rapid growth. The movement to a borderless European Common Market has until 1992 to break down national barriers. Limited laws govern the ownership of broadcast facilities with most restrictions controlling the percentage of foreign ownership. Controversial subjects include programming, a transmission standard (PAL or SECAM) and then what of HDTV?

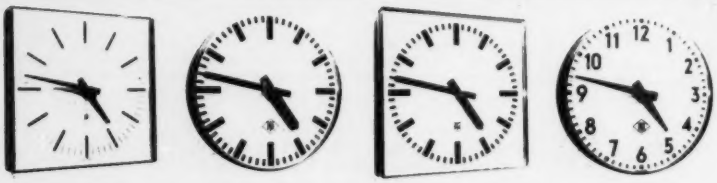
November 1989

Theme: Station Maintenance, 6th annual

Editorial (page 6)
• Sacred cows or just bull?
(Prospects for HDTV carry price tags that are beyond the reasonable amounts stations are likely to be willing or able to pay.)

FCC Update (page 8)
• Agenda set by new chairman.
• Difficult issues: Common carriers, mass media and rule enforcement.
• Radio goals set; strengthening AM radio; speed up FCC procedures; radio pursuit of excellence; voluntary standards based on antitrust laws; shock radio.
• EEO actions; reports of EEO violations resulting in fines.

Strictly TV (page 10)
• Gateways open up the world
(Audiotext and videotext services offer a means for the audience to gain fast access to



The right time all the time.

The broadcast industry demands perfect timing. When the exact time on all your clocks is critical, you can rely on the high quality and reliability of TN master and slave clocks.

Over 50 different designs are all exceptionally silent running and easy to read even from a distance.

TELENORMA
BOSCH Group

Call or write for a free brochure:

TIME SERVICE SYSTEMS INC.
620 Alden Rd., Ste. 102
Markham, Ontario
Canada L3R 9R7
Phone (416) 940-1566
FAX (416) 479-9081
Telex 06-966585

DEALER & REPRESENTATIVE ENQUIRIES INVITED

Circle (86) on Reply Card

FACTORY DIRECT

Custom Cases | Acoustic Foam | Custom Stands | Studio Furniture

Request Catalogue 800-343-1433, 516-563-0633
Island Cases, 1121-20 Lincoln Ave., Holbrook NY 11741

Circle (65) on Reply Card

PRECISION MAGNETIC TEST TAPES

STL

Standard Tape Laboratory, Inc.
26120 Eden Landing Road #5, Hayward, CA 94545
(415) 786-3546

Circle (88) on Reply Card

VIDEO SUPPLIES

CABLES • CONNECTORS • CAMARC • BELDEN • SWITCHCRAFT • D.A.'s • TIES • BATTERIES • NEUTRIK • 66 INTERFACE BOXES • TAPE • 500 DIFF. TAPE LABELS • GAFFERS TAPE • CASES • PATCH BAYS • LIGHTS • ACOUSTIC FOAM • FORMS • MICROPHONES • SONEX • STANDS • MOUNTS • WIND SCREENS • ZEPPELINS • FIBRE OPTICS • RACKS • DUCT • REELS • TESTERS • FILTERS • CHEMICALS • TOOLS • ON-AIR LIGHTS • DEGAUSSERS • INTERFACE DEVICES • HEADPHONES • CLIPS • SWITCHES • CAM & S-VHS CABLE

FREE! America's most unique catalog for audio and video!

MARKERTEK VIDEO SUPPLY
145 Urban Ave., Saugerties, NY 12477, U.S.A.
TOLL FREE 1-800-522-2025
In NY: 914-246-3036

Circle (87) on Reply Card

information, but the service may take away from actual viewer and listener numbers.)

re:Radio (page 12)

• Pre-winter maintenance checklist, Part 2

(Antenna component inspection, lightning protection, spares, records and new rules for a suggested list for close observation.)

Satellite Technology (page 14)

• First bird launched 25 years ago

(Early Bird and INTELSAT launched the satellite communications era, along with the use of the geosynchronous orbit concept.)

Circuits (page 16)

• Use Smith charts for RF design

(Working with RF signals calls for an understanding of some mathematics to do design calculations. The Smith chart presents an easier way to make highly accurate estimations of impedance, VSWR and other RF characteristics.)

Troubleshooting (page 18)

• CD troubleshooting, Part 6

(Missing data, caused by media flaws or improper handling, has caused more trouble for CD program reproduction than mechanical and electronic failures.)

Management for Engineers (page 20)

• On being a leader, Part 8

(The message and its delivery to your subordinates, no matter what the subject, has a good deal to do with how well it is received.)

• **Servicing Local Area Networks** (page 26)

by Michael W. Dahlgren, Novell Service Division, Provo, UT

The LAN connection between products in the studio requires a different approach by the maintenance department and has become a very lucrative field in information systems operations. Operation is based upon the 7-layer OSI communications protocol. When appropriate fiber-optic interface hardware is available, LAN systems will expand to that area as well.

Key words: LAN, OSI; physical, datalink, network, transport, session, presentation, application layers; FDDI.

• **The New Breed of Test Instruments** (page 32)

by Conrad Persson, editor, *Electronic Servicing & Technology*

Maintenance technicians will appreciate the digital multimeters and logic probes as test instruments for use in troubleshooting digital-based products. Signal level measurements are based upon a slope of charge and discharge, which are proportional to the level being measured. Logic probes provide a means to look at the data moving along a databus, displaying the information with an LED array or an oscilloscope CRT.

Key words: DMM, LSI, logic probes, slope/multislope integration.

• **Advances in Digital Oscilloscopes** (page 42)

by Steve Montgomery, LeCroy Corporation, Chestnut Ridge, NY

Digital oscilloscopes offer benefits not available to analog instruments. One is memory storage, allowing a waveform to be stored for later observation as a reference for comparison with more recent measurements. Once stored, various manipulations, including expansion of small sections, can be used to study signal activities in greater detail.

Key words: DSO, CRT cursors, single-shot, triggering modes; pulse-width, interval, pattern, state-qualified triggering; multiple channels.

• **Automated Test Instruments** (page 48)

by Gregory D. Carey, Sencore, Sioux Falls, SD

PCs may serve in the maintenance process through RS-232 and IEEE-488 GPIB interface cards. Both have advantages for different applications. Additional protocol may be necessary in some cases. The length of the lines between products may affect accuracy in signal transmission, but utility packages are available as line extensions. Another concern is use of the correct interface product for specific situations and some possible variations between different versions of protocol.

Key words: RS-232, IEEE-488, GPIB, HPIB, serial, parallel, connectors, line extenders, data transfer rates, handshaking, CD1/CD3 (X-On/X-Off), software.

• **Maintaining Small Format VCRs** (page 69)

by Brent Robinson, KSL-TV, Salt Lake City

Any video recorder maintenance sometimes presents problems, but small format systems

New from AOR

2000 Channels 5MHz to 1500MHz

AR2515

•Covers 5MHz to 1500MHz in AM/FM/Wide FM modes. Continuous coverage.
•2000 Channel Memory. 1984 Scan Frequencies & 16 Search Groups.
•Scan/Search speeds up to 36 channels or increments per second.
•Built in RS 232 computer interface.
•25 Day Satisfaction Guarantee. Full Refund if not Satisfied.
•Size: 3½"H x 5⅛"W x 7⅛"D. Wt.. 2 lb. 10 oz.
•Supplied with AC & DC power cords. Telescopic antenna.

Total Price. Freight Prepaid (Express Shipping Optional) *Upgrades of AR2002's to AR2515 specs Available.

$695.00

ACE COMMUNICATIONS
10707 E. 106th St. Indpls., IN 46256
Toll Free 800-445-7717
Visa and MasterCard
(COD slightly higher)
In Indiana 317-849-2570 Collect FAX (317) 849-8794

Circle (69) on Reply Card

CINE 60 SUN-GUN

Beautifully Simple

Beautiful because it's fresnel-soft and uniform — ideal for video. And simple because if 250 Watts is too much, change to 150 Watts. Need more? Go to 350 Watts. Want to go really light? Use 100W (12V) or 70W (14.4V) Outdoors, swing-in the built-on Daylight Filter. You color correct instantly! Indoors, swing away Filter and you have tungsten light! Never a need to readjust camera color controls here! For focus, vary the beam from 8 to 14 ft. For power, choose from 84 Battery Belts and Battery Packs. And, to make it beautifully simple we put it all together for you in any one of 48 Portable Sun-Gun Kits, including Switchable 30V/14.4V combination Kits. See your dealer or send for data, today.

CINE 60

630 9th AVENUE NEW YORK, N.Y. 10036 212/586-8782
1600 CAHUENGA BLVD. HOLLYWOOD, CALIFORNIA 90028 213/461-3046

Circle (68) on Reply Card

can pose special problems, often resulting from the reduced size of the equipment. As with any recorder, preventive measures and cleanliness are highly desirable for long life, as are correct tape tensions. The smaller sizes may also mean more critical adjustments of servo circuits and other attributes required to overcome the instabilities solved by inertial properties of larger equipment. Multiple channels and component video signals offer new challenges toward balancing of signal processing circuits.
Key words: component analog video, mechanical wear, tape tension, signal systems, component timing, Bowtie signals, comb filters.

• **Tape Recording Technology** (page 78)
by Jerry Whitaker, editorial director
Storage of audio and video information on magnetic media has had a greater impact on broadcasting than any other development since the invention of the two RF transmission systems. This article tracks the evolution of technology from the first Magnetophone machines brought into the U.S. to the present day. Numerous people and companies were involved in the process, with Bing Crosby being a driving force behind early U.S. developments. Kinescope recordings of video on film preceded magnetic video recording technology for early TV, but when the problems of high-density storage on tape were solved, video recording immediately became the standard approach to program storage.
Key words: Magnetophone, Poulsen, Mullin, AEG, Bing Crosby, Ampex, RCA, kinescope, Ritcheouluff, Schroeter, Marzocci, FM recording, Sarnoff, Sony, VERA, BBC, Axon, quadruplex, helical scan, NAB'56, audio carts, Nolte, Collins, endless loops.

Station-to-Station (page 112)
• ACTS sets computer time and much more
(The Automated Computer Time Service provides time data in an ASCII format via telephone lines to keep station clocks on time. Propagation delay correction is incorporated into the 2-way data transmission system.)

SBE Update (page 118)
• Some new staffers in Indianapolis will assist executive secretary.
• Ennes Foundation awarded free tuition for NAB 5-day satellite uplink seminar.
• Ennes Foundation grant awarded to SBE member living in the Philippines.
• Certification exams scheduled between Nov. 10-20; next test schedule during NAB '90.
• Ennes Foundation testing computerized study guide for five different levels of SBE certification tests.
• Insurance coverage program through New York Life continues to be offered.
• Members of SBE for 15 years or more can upgrade to senior status.

December

Theme: What's in Store for 1990?

Editorial (page 6)
• No rocket scientists
(A segment of **BE** starting in May has included material taken from back issues as well as other sources, giving a historic perspective of the broadcast industry. It has been 30 good years.)

FCC Update (page 8)
• 24-hour ban on indecency in broadcast under study.
• Action taken on 95 indecency complaints.
• LPTV filing window opened for early December; limit of five new stations.
• Station totals for AM, FM, TV, boosters and translators.

Strictly TV (page 10)
• Election network saves the day
(Equipment in the newroom converses efficiently through local area networks.)

re:Radio (page 12)
• From SBE to the elusive antenna
(Over time, descriptions of monitoring points may become confused. Aerial photographs, a topographical map and help from a surveyor can get your pattern back in shape.

Satellite Technology (page 14)
• Space age nose test
(A need to avoid unpleasant odors in manned space capsules uses a panel of expert noses checking every item that will be inside the occupied portion of the craft.)

Circuits (page 16)
• Use Smith charts for RF design, Part 2

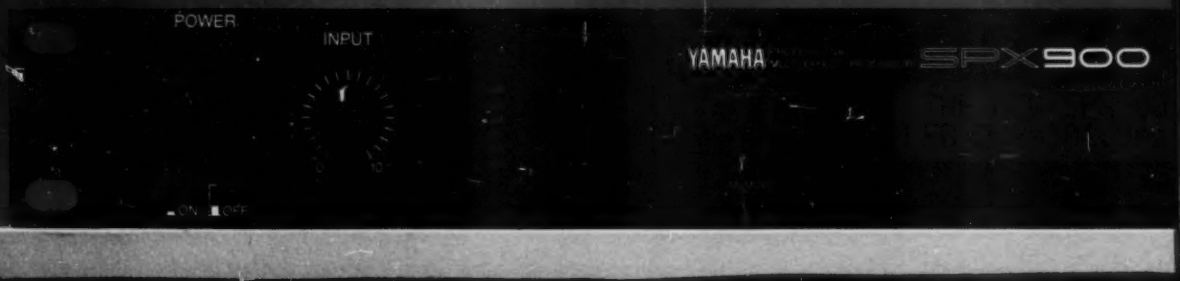
If you thought youd never hear anything better than the SPX90, it's only because you haven't yet heard the new SPX900 Professional Multi-Effect Processor.

It's got more features, more functions and more effects. It's got an awe-inspiring sound, and an amazingly friendly price. Just name it, and the SPX900 Professional Multi-Effect Processor does it better. In fact, exceptionally better than anything that most likely impressed you before.

RCX1 optional full-function remote.

At the heart of the matter is Yamaha's new second generation DSP processing chip. A powerful little guy that gives the SPX900 fuller, lusher, smoother reverbs. Simultaneous effect programs. And 20 kHz bandwidth. Not to mention more MIDI

Its most spectacular effect is o



(Estimations of impedance, VSWR and other RF characteristics are simplified.)

Troubleshooting (page 18)

• CD troubleshooting, Part 7

(Careful Handling of CD media and occasional cleaning prolongs the life of your investment and improves performance.)

Management for Engineers (page 20)

• Feeling important, Part 1

(Successful management takes into account the employee's self image. Positive reinforcement generates a good self image and promotes better work.

• **State-of-the-Industry Report** (page 26)

by Brad Dick, technical editor

Contrasting 1988 responses that indicated 1989 would show economic improvements, budgeting for equipment purchases is reduced for 1990. Only in the top 100 markets is an increase in facilities upgrades of 3% expected. An estimated median in equipment budgeting for 1990 shows cuts as much as 22% over 1989 for TV, although non-commercial stations show projected increases of 10%. For radio, the equipment budget median shows an increase of 28.5% industry-wide, offsetting a reduction that had been planned for 1989. Station staffing is expected to drop, perhaps by as much as 20%.

• **View from the Top** (page 38)

by Brad Dick and Rick Lehtinen, technical editors

Interviews with James McKinney, chairman, the Advanced Television Systems Committee (ATSC) and Raymond Smith, chairman, Bell Atlantic Corporation, explore the future of HDTV as a communications medium. Areas discussed include the transmission medium, off-air or wired; the role of Europe and Japan in a standard; and roles played by NAB, the FCC and government in general. One question begs for an answer before other decisions are made: What does the US want from HDTV?

Key words: HDTV, simulcast, improved NTSC, digital TV, phone companies (BOCs), Eureka, fiber optics, broadband networks.

• **New Dimensions in Integrated Circuits** (page 49)

by Jerry Whitaker, editorial director

Wafer-scale integration (WSI), the super chip, has been proposed as a major step in solid-state circuitry, but removal of heat from densely populated wafers presents problems. Predictions include superconductive tunnel effects as a means to increasing switching speeds by factors ranging from 10× to 100×. Vacuum ICs, including a microelectronic CRT, and 16Mb dynamic RAM also figure in future products, as do increased RISC and ASIC devices. The human imagination and device manufacturing yields, not the sky, are the limits of the future.

Key words: WSI, VLSI, ASIC, RISC, superconductor, vacuum microelectronics, DRAM, DSP, Harvard architecture, SHPi, GaAs-on-Si, Si-on-insulator, silicon-on-sapphire, molded circuit device (MCD), high-density multichip interconnect (HDMI).

• **Advanced Technologies** (page 74)

by Jerry Whitaker, editorial director

A revolution in communications began with the transistor effect, described by Shockley of Bell Laboratories in 1947. That revolution is still in progress, impacting communications in general and broadcasting in particular by means of increased device functional power and decreased device sizes. The satellite service became a reality, based upon the existence and capability of solid-state devices and the predictions of Archur C. Clarke, and today continues to change the way the world communicates. Solid-state and computer technology has also introduced the automation revolution, a slowly growing phenomenon promising more productive and cost-effective operations.

SBE Update (page 124)

• New society officers installed at convention: Brad Dick, president; Richard Farquhar, vice president; Paul Lentz, secretary; Bill Harris, treasurer; directors, Phil Aaland, Dane Ericksen, Bill Hineman, Tom Weems, Fred Baumgartner, Chuck Kelly.

• Policy to stress director and officer accountability; a series of newsletters will keep society members informed.

• FCC Felker addressed convention, urged SBE engineers get involved in selection of HDTV standard.

• Ennes workshops, exhibit/seminar hours at convention deemed successful.

• McKain, Van Buhler awarded fellowships to recognize service to society.

control and a new reverb algorithm that lets you design your own three-dimensional space. All controllable from its own optional dedicated remote.

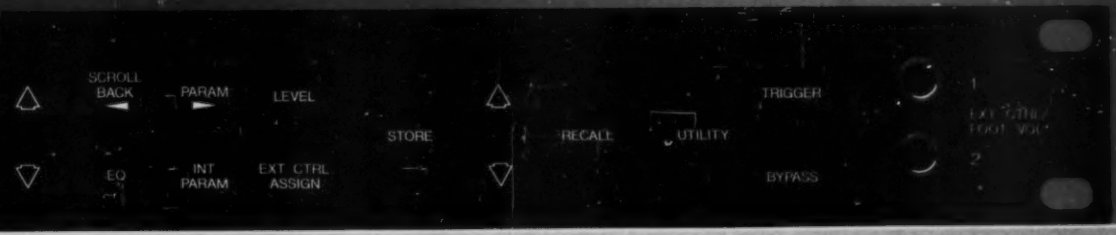
Meanwhile its companion, the SPX1000, has digital inputs and outputs for direct digital access to professional quality processing.

The SPX900 and SPX1000 Professional Multi-Effects Processors. Now performing special effects at a Yamaha Professional Audio dealer near you.

Yamaha Corporation of America, Professional Audio Division, P.O. Box 6600, Buena Park, CA 90622-6022. In Canada, Yamaha Canada Music Ltd., 135 Milner Avenue, Scarborough, Ontario M1S3R1.

YAMAHA
Professional Audio Division

utperforming its predecessors.



Circle (30) on Reply Card

Articles by subject

Audio

Applied Technology/Dolby matrix for surround sound 10-128
Audio Fidelity: the Grand Illusion 10-68
Control-Room Monitoring Systems 7-26
Disk Recording and Editing 2-58
Planning for an Audio Routing Switcher 7-56
Station-to-Station/Audio step generator makes testing easier 1-123
The Ins and Outs of Microphones 8-70
Using Close-field Monitors 7-38

Automation/Computer/Data

Circuits/Have a taste of telephone soup 6-16
Circuits/ISDN to bring better service ... 7-16
Circuits/More about modems 4-16
Circuits/Semi-custom ASICs 1-16
Circuits/Technology builds on the basic telephone 2-16
Circuits/The modem is a great communicator 3-16
Circuits/Today's modems are fast and versatile 5-16
Computerized Election Reporting 1-52
Easing Into Newsroom Automation 8-26
Ethernet in the Newsroom 1-58
Inside Mathematics Processors 2-26
MIDI: What's In It For Broadcasters? ... 2-82
Strictly TV/The dollars and sense of automation 3-10
Strictly TV/The seven layers of OSI 5-10
The Automation Equation 6-42
The Bottom Line in Automation 3-26
Writing Applications Programs for a PC 9-42

Facilities/Design/Renovation

Acoustical Design and Monitoring Requirements 4-76
Acoustical Door Design 4-98
Building on the "Rock" 4-66
Circuits/Use smith charts for RF design 11-16, 12-16
Designing a Post-Production Center 4-40
News Special Report/Updating the VOA 1-112
Planning for Mobile Operations 1-26
Planning for Standby ac Power 3-46

Field Reports

Ampex ACE 25 editing system 4-266
Arrakis 10,000 series audio console ... 5-126
Audio-Technica AT4462 portable mixer 9-108
Broadcast Electronics Phase Trak 90 cart machine 2-107
Gentner VRC-1000 remote control system 1-119
Hewlett Packard Goldline model 30 real-time analyzer 10-146
Odetics TCS2000 video cart machine . 4-260
Sola 3kVA UPS system 3-92
Sony PCM-2500 R-DAT recorder 4-272

General Interest/Management

Advanced Technologies: 30 Years of Service 12-74
AM Radio: Regrouping for the 21st Century 5-96
AM Stereo: Its Time Has Come 10-58
Editorial ..... 1-6 through 12-6
FCC Update ..... 1-8 through 12-8
Five Decades of Magnetic Tape 5-36
Getting Ready for NAB 3-68
HDTV: Politics on a Grand Scale 6-186
Management for Engineers ..... 1-20 through 12-20
Milestones in the Evolution of Technology 5-22
NAB '89 Exhibitor Listings 4-234
NAB Engineering Conference Report .. 6-24
New at NAB 6-88
New Dimensions in Integrated Circuits 12-49
News Special Report/Broadcasting in a borderless Europe 10-149
News Special Report/Winter CES: On the other side of the tube 3-78
Perspective on NAB '89 6-23
Perspective on the Industry 5-54
Radio: the Roots of Broadcasting 9-116
re:Radio/A pirate network strives for legality 4-12
re:Radio/Some thoughts about the "good old days" 2-12
re:Radio/Time may be ripe for new low-power FM 1-12
SBE Observes a Milestone 6-192
SBE Update 1-110, 2-96, 3-106, 4-22, 5-138, 6-193, 7-108, 8-110, 9-114, 10-148, 11-118, 12-124

CAMERA REMOTE CONTROL THE SENSIBLE WAY

Control Pan-Tilt-Trolley-Zoom-Focus

with

- Simple Joystick Panel
- Presetable Shot Panel
- Touch Screen Panel
- Computer RS-232/422

thru

- Multicore Cable
- Twisted Pair
- Telephone Modem

Telemetrics – for over 20 years the innovators of camera control systems.

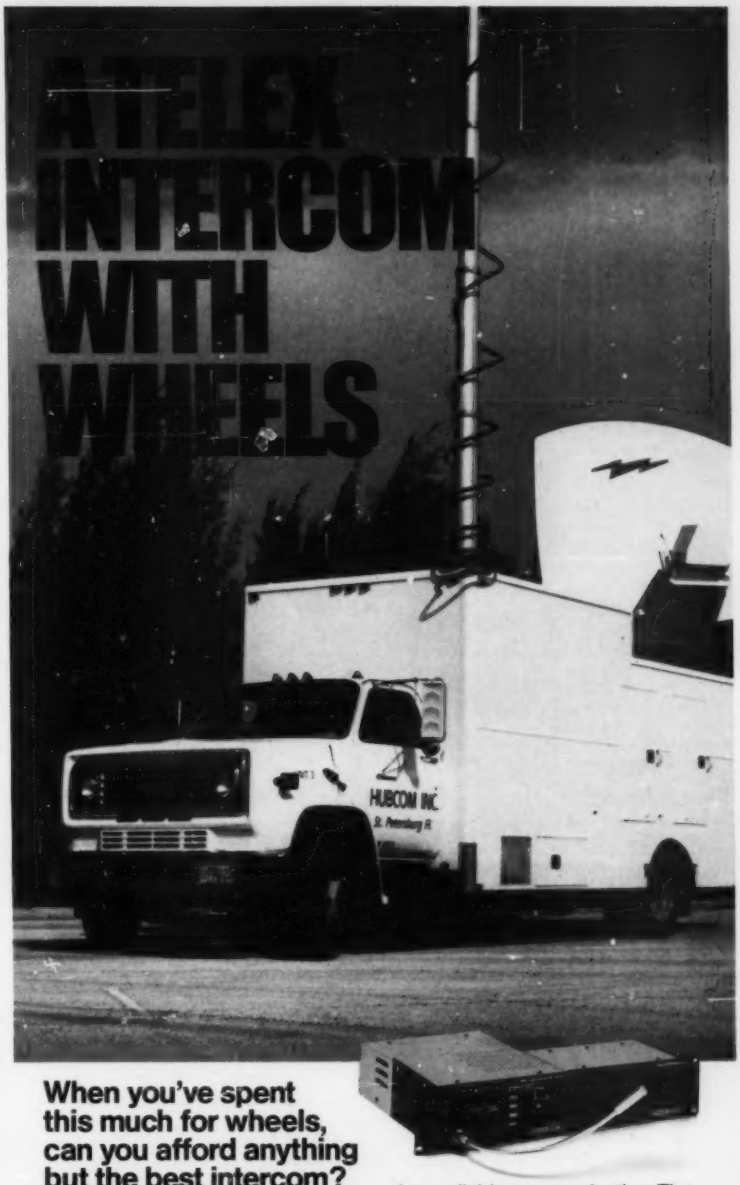
Telemetrics
7 Valley St. Hawthorne, N.J. 07506
For Information Call (201) 423-0347

Circle (100) on Reply Card

Selling Management on AM Stereo ... 10-48
Setting Standards for the Future 7-98
Show Preview/ITS to showcase an HDTV festival 5-140
Show Preview/NAB engineering conference, Las Vegas 4-26
Show Preview/Don't miss the SBE anniversary party 9-90
Show Preview/SMPTE to be the season finale 9-106
Show Replay/ITS Montreux 8-106
Show Replay/SBE/Denver 1-102
Show Replay/SMPTE/New York 1-106
State of the Digital Studio 2-42
State-of-the-Industry Report 12-26
Station-to-Station/Installation works in RF environment 2-104
Station-to-Station/Living by the rules 3-100
Strictly TV/Design may prevent VDT user symptons 4-10
Strictly TV/Designer test signals aid troubleshooting 8-10
Strictly TV/Exploring battlefield fiber .. 9-10
Strictly TV/Gateways open upon the world 11-10
Strictly TV/Organize maintenance with software 10-10
Strictly TV/Tape defects defined by RF signature 6-10
Switching Fiber-Optic Signals 9-26
Tape Recording Technology 11-78
Technical Education for Broadcast Engineers 2-90
The 1989 Salary Survey: Dividing the Pie 10-26
The Chemistry of Batteries 1-68
The Future of Fiber 5-74
The HDTV Scorecard 6-32
The Mechanisms of Tape Wear 10-84
The Pick Hits of NAB '89 6-72
The Revolution of Television 10-96
Timing Is Everything 3-36
Tracking the State-of-the-Art 1-78
Using Cellular Telephones 1-42
View from the Top 12-38

Maintenance/Measurements
Advances in Analog Instrumentation ... 8-56
Advances in Digital Oscilloscopes 11-42
Automated Test Instruments 11-48
Circuits/Thermistors measure microwave power 10-16
Circuits/Thermistors used in temperature control 8-16
Circuits/Using thermistors for time delay 9-16
Maintaining Small Format VCRs 11-65
Servicing Local Area Networks 11-26
Station-to-Station/ 11-112
Station-to-Station/Microwave spare parts shortage 10-138
Station-to-Station/Supplemental system handles remote control 4-290
The New Breed of Test Instruments ... 11-32
Troubleshooting/CD troubleshooting ... 6-18 through 12-18
Troubleshooting/In pursuit of the elusive intermittent 2-18
Troubleshooting/Maintaining your computer ..... 3-8 through 5-18
Troubleshooting/Use a color scheme for wiring 1-18

Radio Systems
AM Power Reduction Techniques 3-58
Applied Technology/Digital



When you've spent this much for wheels, can you afford anything but the best intercom? Audiocom™!

When the call comes from dispatch, you have to roll. You literally move your broadcast station to the news making scene via the mobile van. Telex Audiocom intercoms are designed to tie your on-the-scene communication network together. Our Telex IC-4M four-channel master station is a necessary requirement of mobile broadcast vans nationwide. The IC-4M unites producer, camera technicians, director and talent together for clear, reliable communication. The IC-4M is easily flush-mounted and is built ruggedly to take the punishment of a fast-moving news crew. Telex intercoms can take it.

Telex also offers a line of quality belt-pack intercom stations and intercom headsets to complete your communication network.

For more information about Telex Intercom Products for broadcast, write to: Telex Communications, Inc., 9600 Aldrich Avenue South, Minneapolis, MN 55420.

© 1989 Telex Communications, Inc.

TELEX®

Circle (91) on Reply Card

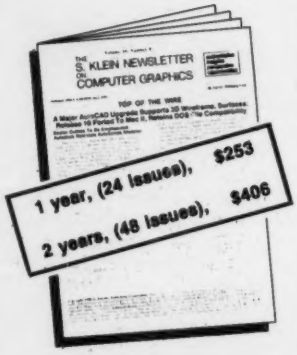
modulation using the NCMO 3-84
Designing an FM Booster System 9-72
re:Radio/1/4-wave isolating sections still work 3-12
re:Radio/Beyond the coverage map 6-12, 7-12
re:Radio/From SBE to the elusive antenna 12-12
re:Radio/If high-tech fails, use humble basics 5-12
re:Radio/Pre-winter maintenance checklist 10-12, 11-12
re:Radio/Taking the measure of your station 8-12, 9-12
SCA Technology Update 10-77

Satellite
Managing Satellite Operations 7-88
Satellite Technology/The making of a space station 8-14
Satellite Technology/A look back at 1988 1-14
Satellite Technology/Fiber transmission seems to be the fix 3-14
Satellite Technology/First bird launched 25 years ago 11-14
Satellite Technology/It's time for spring cleaning 5-14
Satellite Technology/Space robots are at hand 4-14
Satellite Technology/Spread spectrum technology 2-14
Satellite Technology/Sunspots affect communications 7-14
Satellite Technology/Team goes to work in robotics center 9-14
Satellite Technology/The business world turns to VSAT 6-14
Satellite Technology/Winter's coming; prepare now! 10-14

TV Systems
Applied Technology/Doubly truncated waveguide 1-114
Applied Technology/Modulation monitoring for BTSC sound 4-280
News Special Report/An ATTC progress report 8-118
Strictly TV/A new beginning for HDTV? 2-10
Strictly TV/Inside the visual PA, Part 4 1-10
UHF Multichannel Antenna Systems . . 4-110
UHF-TV: Breaking New Efficiency Records 5-104

Video
Applied Technology/Batteries for field applications 2-98
Applied Technology/Film-to-tape transfer systems 8-111
Enhancing NTSC 4-244
Inside Standards Conversion 8-38
Lenses: Is What You See, What You Get? 9-66
Role of Film in Television 8-98
Station-to-Station/Vertical interval AGC meter 8-115
Strictly TV/VBI heats up 7-10
The CCD Scoreboard 9-57

Receive the latest industry news on key market facts and trends with The S. Klein Newsletter on Computer Graphics



If you need incisive reports on developments in every key area of computer graphics and image processing as they happen—*The S. Klein Newsletter on Computer Graphics* is for you!

Twice a month, *The S. Klein Newsletter* cuts through the clutter to bring you up-to-the-minute news in the computer graphics industry. Through insightful, interpretive reports, you'll learn about the latest developments in:

- Animation & Visual Arts
- Business & Presentation Graphics
- CAD/CAM
- Research & Development
- Databases

You'll be among the first to hear about the latest technology—from hardware and software to systems and services. You'll receive reports on new companies as they are formed... applications as they are discovered... market trends as they begin... and much more!

Get the facts you need for profitable decision making... subscribe TODAY!

For more information, or to place an order, call Dan Baker at 1-800-666-GRAPhics or write: S. Klein Newsletter, Intertec Publishing, P.O. Box 12942, Overland Park, KS 66212

Advertising sales offices

NEW YORK, NEW YORK
Diane Gottlieb-Klusner
Telephone: (212) 702-3404
Telefax: (212) 702-7802
Mike Trerotoli
Telephone: (212) 702-3405
Telefax: (212) 702-7802
866 Third Ave.
New York, NY 10022

CHICAGO, ILLINOIS
Vytas Urbonas
Telephone: (312) 435-2361
Telefax: (312) 922-1408
55 East Jackson
Suite 1100
Chicago, IL 60604

SANTA MONICA, CALIFORNIA
Herbert A. Schiff
Telephone: (213) 393-9285
Telefax: (213) 393-2381
Jason Perlman
Telephone: (213) 458-9987
Telefax: (213) 393-2381
Schiff & Associates
501 Santa Monica Blvd, Ste. 504.
Santa Monica, CA 90401

OXFORD, ENGLAND
Nicholas McGeachin
Intertec Publishing Corp.
Roseleigh House
New Street
Deddington
Oxford OX5 4SP
England
Telephone: (0869) 38794
Telefax: (0869) 38040
Telex: 837469 BES G

TOKYO, JAPAN
Mashy Yoshikawa
Orient Echo, Inc.
1101 Grand Maison
Shimomiyabi-Cho 2-18
Shinjuku-ku, Tokyo 162, Japan
Telephone: (03) 235-5961
Telex: J-33376 MYORIENT

FREWVILLE, SOUTH AUSTRALIA
John Williamson
Hastwell, Williamson, Rep. Pty. Ltd.
109 Conyngham Street
Frewville 5063
South Australia
Phone: 799-522
FAX: 08 79 9522
Telex: AA87113 HANDM

CLASSIFIED ADVERTISING
OVERLAND PARK, KANSAS
Renée Hambleton
P.O. Box 12901
Overland Park, KS 66212
913-888-4664

Use BE classified ads